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UNITED STATES DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH ADMINISTRATION  
Bureau of Plant Industry, Soils, and Agricultural Engineering  
and  
PRODUCTION AND MARKETING ADMINISTRATION  
(NOT FOR PUBLICATION)

MILLING, BAKING, AND CHEMICAL EXPERIMENTS WITH HARD RED SPRING WHEAT  
1948 CROP 1/

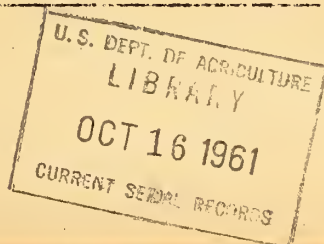
BY

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- 1/ Cooperative investigations of the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, and the Grain Branch, Production and Marketing Administration. The samples were obtained from the cooperative experiments with the State Agricultural Experiment Stations in the spring wheat region.

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## INTRODUCTION

Samples of the standard varieties and some of the new hybrid strains of hard red spring wheat, grown in cooperative experiments in the spring-wheat region 2/ of the United States, are milled each year by the United States Department of Agriculture and the flour baked into bread to determine their quality characteristics.

The baking methods and techniques used on the 1948 crop were essentially the same as used in testing the wheat varieties and hybrid strains from the 1944, 1945, 1946 and 1947 crops. The bread-baking tests included one method that has been used also for the 1939 to 1943 samples inclusive (No. 6 baking test in the reports for these years).

The purpose of this report is to make available to cooperators the quality data from the 1948 crop obtained from standard varieties, new hybrid strains, and Federal supervision grade samples of hard red spring wheat, together with a summary of previous years' results.

## SOURCE OF SAMPLES

Extensive tests were made on Eastern and Western composite samples of each of seven uniform varieties and of many additional varieties and strains grown in plot experiments at cooperating stations. These included samples grown at Madison, Wis.; St. Paul, Rosemont, Morris, and Crookston, Minn.; Fargo, Langdon, Edgeley, Williston, Minot, Mandan and Dickinson, N. Dak.; Brookings, Eureka, Highmore, and Newell, S. Dak.; Moccasin, Mont.; Sheridan, Wyo.; and Akron, Colo. Similar tests were made on Eastern and Western composites of the 26 strains grown in the Uniform Regional Nurseries; on the wheats in the North Dakota and Montana Intrastate Nurseries; and those from station nurseries grown at Madison, Wis.; Brookings, S. Dak.; Langdon, Mandan, and Dickinson, N. Dak.; and Moccasin, Mont.

There were also included 15 samples composited from samples of carlot receipts of wheat accumulated during a 90-day period of the 1948 crop movement by the Minneapolis, Duluth, Denver, and Great Falls offices of the Grain Branch, Production and Marketing Administration. These samples represent country-run wheat of the hard red spring class and included those only that were graded No. 3 or better under the provisions of the U. S. Grain Standards Act. These are hereafter referred to as commercial samples. This is the tenth season that such samples have been collected and tested.

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2/ Clark, J. A. Results of spring wheat varieties grown in cooperative plot and nursery experiments in the spring-wheat region in 1948, with averages for 1938 to 1948. U. S. Dept. Agr., Agr. Res. Admin., Bur. Plant Indus., Soils, and Agr. Engin., Div. Cereal Crops and Dis. 128CC, 50 pp. February 1949. (Processed.)

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# METHODS USED IN THE MILLING AND BAKING TESTS

After the removal of dockage the samples were prepared for milling by the use of a milling separator and a scourer (both machines of experimental or laboratory size). The wheats were tempered in two stages; first to 14 percent of moisture for 48 hours and then additional amounts of water added 1/2 hour previous to milling, raising the moisture content of the grain to between 15.0 and 16.5 percent depending upon the hardness of the variety. The wheat was milled on an Allis-Chalmers experimental flour mill provided with three break rolls and one smooth roll. A 90 percent patent flour was made, discarding the low grade.

All test weights were determined in the laboratory on dockage-free grain. The protein and ash contents are reported on a 14.0 percent moisture basis and the flour yield on a moisture-free basis.

The hardness of the grain was determined by pearling 20 grams of dockage-free whole wheat for 1 minute in a model No. 38 Strong-Scott Pearler. The amount of material pearled off expressed as a percentage of the wheat is called the pearling index. This pearling index has been found useful not only as a guide in tempering the samples for milling, but also as a measure of the vitreous character of the grain. A low index figure indicates hard grain and a high index figure soft grain.

The bread-baking tests on the 1948 samples (same as used on the 1944, 1945, 1946 and 1947 samples) were made by a rich highly bromated formula.

Details of the methods used in 1948, with the various ingredients, are shown in table 1.

Table 1 - Baking methods used for samples of the 1948 crop.

Ingredients and other items	Baking Method
	Commercial-bromate-malted wheat flour
Flour (grams)	100.0
Yeast (grams)	2.0
Salt (grams)	1.5
Sugar (grams)	5.0
Potassium bromate (grams) <sup>1/</sup>	.0 to .004
Malted wheat flour (grams)	.25
Nonfat dry milk solids (grams)	4.0
Shortening (grams)	3.0
Water absorption (percent)	Optimum for each variety
Mixing time (minutes)	Optimum for each variety
Fermentation time (minutes)	180

<sup>1/</sup> 0, 1, 2, 3, and 4 mg.

### Fermentation periods:

1st. punch after 105 minutes  
2nd. punch after additional 50 minutes  
Mold after additional 25 minutes  
Proofing time - 55 minutes  
Baked 25 minutes at 450°F.

This baking procedure is based on the method of the American Association of Cereal Chemists, with certain modifications deemed necessary for unbleached experimentally milled flour. Because of the size of the mixing bowl, ingredients sufficient for 2 loaves were mixed at one time. They were mixed a sufficient length of time to develop the dough properly in a Hobart-Swanson dough-mixer (108 R.P.M.) with 4 pins in the head and 2 pins in the bowl. The absorption of the flour was calculated from the amount of water added for proper consistency at the time the doughs were mixed. The absorption values are indicated in the tables. When mixed, the doughs were divided, then rounded in the hands, and placed in fermentation granite-ware "oatmeal" bowls, measuring 6 inches top diameter, 3 inches bottom diameter, and 2-1/2 inches deep. The punches were made by folding the dough approximately 10 times in the hands. At the end of the fermentation period the dough was molded by a Thompson mechanical roll type "A" moulder with rolls set at a clearance of 3/8 of an inch and the compression plate 1-1/8 inches. The molded doughs were placed in baking pans constructed from 2XX tin known as the tall form. The proofing time of 55 minutes, at 86°F. and baking time of 25 minutes at 450°F. were the same for all samples. Two loaves of each sample were baked, but since the ingredients were mixed as for one loaf, the two are not duplicates in the sense in which that term is usually used and are not so considered herein. Data given in the tables are averages of the two loaves.

The baking trials were made by varying the amounts of bromate (0 to 4 mg. per 100 grams of flour) with the formula given in table 1. With this baking procedure the optimum or maximum loaf volume is apparently obtained with the flour from each variety or strain. It has generally been found that the loaf having the optimum volume also has the best crumb color and grain texture of the different baking tests made. This test appears to bring out the full strength of the wheats somewhat better than the methods previously used. In actual practice a baking test with 1 milligram and another with 2 milligrams of bromate is made on the same day. Bakes with no bromate or increased amounts of bromate (3 milligrams or higher) are made on the following days until the optimum loaf volume has been determined for each variety or strain. Average volumes are calculated from the three best bakes only. This baking procedure brings each of the samples to its optimum volume by making provision for adequate gas production, by the employment of sufficient sugar diastatic supplements, and sufficient oxidation by the use of increasing amounts of potassium bromate.

A check or standard flour (12.3 percent protein and 0.47 percent ash) was included in the baking trials with each day's tests. The average loaf



volume of 55 baking tests made with the standard flour was 774 cc. and the standard error was 14.3 cc. On this basis the least significant difference between 2 single bakes is 40 cc.

### EXPERIMENTAL RESULTS

The results for the regular methods on plot and nursery composite and station samples are given in tables 2 to 7, and for seven baking methods on the seven uniform varieties in table 8. The results for the commercial samples are shown in table 9, and the correlation and regression coefficients for 9 varieties and strains and the commercial samples are shown in table 10. Summaries of the comparable 1948 samples are averaged in table 11, and 11-year results in table 12. These tables are largely self-explanatory. The varieties or strains are arranged in the tables in order of their optimum loaf volume. The highest ranking variety or strain with respect to each property is indicated by underlining. Acre yields are included, where comparable, to assist in the interpretations of results.

Many varieties and selections from hybrids tested during recent years represent some of the newer material developed by plant breeders. In view of the general interest in them it seems desirable to present the data relating to them although the number of comparisons available for most of the selections is too small to allow very definite conclusions to be drawn. Based on these results, however, new wheats are advanced from station nurseries to the Intrastate and Regional nurseries and then to plots. Possibly the most outstanding new strain tested for the first time in 1948 is 1764 x Henry, N. No. 2211, as shown in table 4 for the Mandan, North Dakota, increase plots, and in table 7 for the Langdon Station Nursery. Outstanding strains such as this are advanced to Regional Nurseries and plot experiments.

Table 2 - Yield, milling, baking and chemical results on the uniform varieties of spring wheat grown at experiment stations from the Eastern and Western composites of the 1948 crop.

Variety or Cross	State or N. No.	C.I. No.	Acre Yield	Test Wgt.	Protein		Flour		Pearling Index Value	Absorption Pct.	Mixing Time Min.	Optimum Brmate	Methods & Volume			Average		
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best	Optimum	Wgt. of Loaf	Crumb Color	Texture
Eastern Composite 1/																		
Cadet		12053	28.0	58.6	14.4	14.0	72.5	.54	29.2	70	2.5	1	950	883	950	154	83	
Hope x Timstein	2776	12488	29.2	59.7	15.1	14.5	75.0	.60	31.4	67	2.5	1	943	908	943	152	87	
Mida x Cadet	1831	12363	30.9	59.5	13.8	13.2	76.0	.54	29.9	66	2.0	2	917	914	920	152	80	
Mida		12008	27.8	60.3	14.5	14.0	74.9	.54	32.7	67	2.5	1	911	882	911	154	83	
Rival		11708	29.4	59.1	14.2	13.9	74.9	.61	31.1	69	2.5	2	868	868	888	154	82	
Thatcher		10003	29.5	58.9	14.6	14.2	73.7	.60	28.1	67	2.5	1	876	861	876	151	73	
Average Range			29.1 59.4 3.1	1.7	14.4 1.3	14.0 1.3	74.5 3.5	.57 .07	30.4 4.6	68 4	2.4 0.5	1.3 1.0	911 82	886 53	915 67	153 3	81 14	
Western Composite 2/																		
Cadet		12053	25.9	58.5	15.0	14.8	73.4	.57	28.1	72	3.0	1	998	956	998	157	88	
Pilot		11945	26.8	58.2	15.4	14.5	71.3	.53	27.8	70	2.5	1	992	958	992	152	80	
Hope x Timstein	2776	12488	27.0	59.5	15.8	15.5	72.3	.53	31.8	69	2.5	1	962	938	962	152	85	
Thatcher		10003	26.3	58.9	15.5	15.4	72.6	.56	30.1	68	2.0	1	956	924	956	152	78	
Mida x Cadet	1831	12363	27.2	60.4	14.1	13.9	74.5	.49	30.7	68	2.5	2	901	890	916	154	80	
Mida		12008	26.4	60.8	15.1	14.8	73.7	.50	31.4	71	2.5	1	905	882	905	158	90	
Average Range			26.6 59.4 1.3	2.6	15.2 1.7	14.8 1.6	73.0 3.2	.53 .08	30.0 4.0	70 4	2.5 1.0	1.2 1.0	952 97	925 76	955 93	154 6	86 12	
Average of Eastern and Western Composites																		
Cadet		12053	27.0	58.3	14.7	14.4	73.0	.56	28.7	71	2.8	1	974	920	974	156	86	
Hope x Timstein	2776	12488	28.1	59.6	15.5	15.0	73.7	.57	31.6	68	2.5	1	953	923	953	152	86	
Mida x Cadet	1831	12363	29.1	60.0	14.0	13.6	75.3	.52	30.3	67	2.0	2	908	902	918	153	80	
Thatcher		10003	27.9	58.9	15.1	14.8	73.2	.58	29.1	68	2.3	1	916	893	916	151	76	
Mida		12008	27.1	60.6	14.8	14.4	74.3	.52	32.1	69	2.5	1	908	882	908	156	87	
Average Range			27.8 59.5 2.1	2.0	14.8 1.5	14.4 1.4	73.9 2.3	.55 .06	30.4 3.4	69 4	2.4 1.8	1.2 1.0	932 66	904 41	934 66	154 5	83 10	

1/ From the Madison, Rosemont, Morris, Crookston, Langdon, Fargo, Edgeley, Brookings and Lincoln station plots.

2/ From the Mandan, Dickinson, Minot, Williston, Harre, Moccasin, Sheridan, North Platte, Alliance and Akron station plots.



Table 3 - Yield, milling, baking, and chemical results for the leading hard red spring wheats grown in replicated "plots" in 1948.

Madison, Wisconsin

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion	Mixing Time	Opti- mum Bro- mate	Methods & Volume		Wgt. of Loaf	Average	
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best		Crumb Color	Grain Texture
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Grams	Score	Score
Hope x Timstein	2776	12488	31.3	60.9	13.7	13.0	73.8	.55	30.8	67	2.5	1	873	845	873	152	85
Newthatch		12318	31.5	60.4	14.1	13.4	73.4	.58	29.0	66	3.0	0	824	815	848	150	88
Rival		11708	32.2	60.3	13.1	12.3	76.1	.63	32.4	69	2.5	1	839	822	839	154	83
Regent		12070	33.0	61.0	13.1	12.4	73.5	.52	30.4	64	2.5	2	821	798	824	149	80
T. x W38-Hope	246	12649	36.2	60.4	12.8	12.0	72.8	.47	31.3	63	2.5	1	812	772	812	150	77
Thatcher		10003	34.3	61.2	13.2	12.3	74.0	.53	28.3	66	3.0	2	761	728	806	151	70
Cadet		12053	37.2	60.7	12.2	11.6	74.1	.56	28.2	69	3.0	1	789	778	789	153	88
Mida x Cadet	1831	12363	37.3	61.8	12.1	11.4	74.3	.52	29.0	66	2.5	1	781	765	781	153	82
Mida		12008	29.8	61.7	12.6	11.6	75.6	.54	33.3	65	2.5	1	778	762	778	152	83
Henry		12265	35.6	60.5	12.2	11.1	76.0	.49	36.6	62	2.5	1	778	759	778	149	73
H196-21	244	12617	35.0	58.9	12.4	11.2	73.8	.45	35.1	62	3.0	1	749	741	749	147	82
Pilot		11945	32.0	60.2	11.7	10.6	73.2	.51	28.1	65	2.5	0	720	722	749	152	82
H195-45	242	12484	36.0	59.8	12.2	11.1	71.7	.47	32.8	62	3.0	0	718	718	744	148	82
Sturgeon		11703	34.0	62.1	13.4	12.1	71.5	.47	38.5	62	2.5	0	702	704	741	151	88
Pilot x Mida	1756	12303	38.8	62.1	12.0	11.2	76.0	.51	30.6	64	2.5	1	735	723	735	151	87
Average			34.3	60.8	12.7	11.8	74.0	.52	31.6	65	2.7	0.9	779	764	790	151	82
Range			9.0	3.2	2.4	2.8	4.6	.18	10.4	7	0.5	2.0	171	141	138	7	18

St. Paul, Minnesota

Mida x Cadet	1831	12363	22.2	57.2	17.3	16.6	72.5	.59	30.3	64	2.5	2	945	961	1010	154	78
Cadet		12053	19.9	55.0	17.8	17.2	68.9	.61	29.3	69	2.5	2	995	991	1003	153	78
Pilot		11945	25.7	56.8	17.2	16.0	69.5	.59	27.4	64	2.0	1	992	941	992	153	85
Timstein x Newthatch	2797	12634	22.9	57.1	16.7	16.0	69.4	.63	28.0	70	2.5	1	965	948	965	154	75
Mida		12008	19.3	59.3	16.8	16.0	71.9	.56	30.8	68	2.5	1	962	933	962	154	90
Merit <sup>2</sup> x Thatcher	2104	12540	21.8	55.9	17.7	16.8	67.8	.71	23.4	69	3.0	1	962	932	962	156	87
Redman		12496	26.1	55.8	16.8	16.4	73.6	.56	33.8	67	2.5	2	943	941	959	153	82
Rival		11708	20.3	57.1	16.3	15.7	73.7	.64	28.3	68	2.5	1	963	930	953	156	82
Pilot x Mida	1756	12303	24.7	59.4	16.2	15.5	71.8	.54	35.0	65	2.5	1	950	908	950	155	87
Henry		12265	22.5	57.1	15.7	14.9	74.1	.56	37.0	64	2.5	2	894	925	945	152	70
Thatcher		10003	23.3	56.7	17.5	17.0	70.9	.59	27.2	66	2.0	2	925	909	931	152	80
Hope x Timstein	2796	12545	26.5	58.2	16.6	15.7	71.3	.58	31.8	66	2.0	1	895	875	899	148	83
Hope x Timstein	2776	12488	25.8	59.0	16.9	16.0	71.6	.55	32.2	67	2.0	1	888	864	888	149	90
Hope x Timstein	2789	12546	28.1	60.5	16.0	15.1	71.8	.62	27.8	67	2.0	2	869	859	870	151	90
Premier x Timstein	2798	12547	21.8	58.0	16.7	16.0	68.4	.71	27.4	66	1.5	0	564	558	567	158	52
Average			23.4	57.5	16.8	16.1	71.1	.60	30.0	67	2.3	1.3	914	898	924	153	80
Range			8.8	5.5	2.1	2.3	6.3	.17	13.6	6	1.5	2.0	431	433	443	10	38

Table 3 - Continued

## Rosemont, Minnesota

Variety or Cross	State or N. No.	C. I. Acre No.	Yield Bu.	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion Pct.	Mixing Time Min.	Opti- mum Bro- mate	Methods & Volume		Wgt. of Loaf	Average Crumb Color Texture	
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best		Grams Score	Score
Redman		12496	13.8	57.2	16.0	15.6	72.8	.48	33.9	67	2.0	2	951	943	968	152	88
Timstein x Newthatch	2797	12634	15.4	57.7	16.0	15.6	72.5	.70	22.1	70	2.5	2	936	923	953	152	88
Mida x Cadet	1831	12363	15.9	60.1	14.8	14.2	73.5	.56	32.1	68	3.0	1	936	904	936	152	85
Thatcher		10003	14.8	59.4	16.2	15.4	73.0	.51	30.0	65	2.5	2	909	902	934	150	78
Hope x Timstein	2776	12488	16.3	60.0	16.3	15.6	71.7	.60	30.8	69	2.5	2	925	911	928	154	88
Mida		12008	13.5	61.0	16.4	15.5	73.8	.55	32.1	67	2.0	1	911	890	911	153	95
Henry		12265	17.4	60.0	14.5	13.7	74.0	.53	38.4	65	2.0	1	908	890	908	150	80
Pilot		11945	17.7	58.8	14.5	13.8	71.6	.51	28.6	66	2.5	0	891	879	905	151	88
Cadet		12053	13.7	58.1	15.1	14.6	74.4	.54	26.3	68	3.0	2	888	878	897	153	88
Mida x Pilot	1756	12303	13.9	61.7	14.5	13.7	72.9	.55	30.5	67	2.5	1	889	853	889	154	93
Hope x Timstein	2796	12545	17.1	60.1	15.4	14.8	72.6	.59	28.0	70	2.5	1	883	858	883	153	85
Rival		11708	14.5	59.6	15.1	14.4	73.6	.61	28.4	69	3.0	1	865	850	865	152	82
Hope x Timstein	2789	12546	18.2	61.0	15.1	14.6	72.5	.61	30.5	69	2.5	1	859	838	859	155	92
Merit x Thatcher	2104	12540	16.9	60.1	14.2	13.6	72.9	.62	22.0	71	3.5	1	845	823	845	154	90
Premier x Timstein	2798	12546	10.7	59.0	17.4	16.2	73.9	.83	26.8	66	1.5	1	498	486	498	157	50
Average Range		15.3	59.6	15.4	14.8	14.8	73.0	.59	29.4	68	2.5	1.3	873	849	879	153	84
		7.5	4.5	3.2	2.6	2.6	2.8	.35	16.4	6	2.0	2.0	453	457	470	7	45

## Morris, Minnesota

Redman		12496	39.5	58.1	15.4	14.7	72.1	.53	31.8	67	2.5	1	908	863	908	151	88
Timstein x Newthatch	2797	12634	39.4	58.8	15.4	14.6	70.7	.63	24.9	69	2.5	1	900	852	900	153	88
Henry		12265	37.3	59.1	14.8	13.8	75.0	.50	39.0	64	2.5	2	892	854	899	148	87
Pilot		11945	37.9	58.6	15.5	14.6	72.1	.52	28.9	68	2.5	0	876	852	894	152	88
Thatcher		10003	36.5	59.2	16.0	15.3	73.2	.56	29.7	66	2.0	1	889	832	889	154	87
Mida		12008	33.8	61.2	15.6	14.6	73.9	.52	31.1	68	2.5	1	885	828	885	152	87
Mida x Cadet	1831	12363	37.2	60.7	15.6	14.8	73.5	.54	30.3	68	2.0	1	878	844	878	152	83
Merit x Thatcher	2104	12540	36.1	58.9	15.7	14.6	70.9	.64	23.7	72	3.0	1	873	841	873	154	90
Rival		11708	37.0	59.1	15.2	14.4	73.4	.61	28.7	72	3.0	0	851	797	860	156	87
Hope x Timstein	2776	12488	35.1	60.0	16.0	14.8	71.7	.58	29.1	69	3.0	0	845	828	859	153	88
Cadet		12053	34.9	58.6	15.8	15.1	72.8	.60	25.3	69	2.5	1	845	810	845	155	82
Mida x Pilot	1756	12303	38.2	61.5	14.6	13.6	71.9	.47	31.5	66	2.5	1	842	810	842	151	92
Hope x Timstein	2789	12546	42.9	61.1	15.2	14.7	74.1	.64	26.0	71	2.5	1	789	769	789	156	80
Hope x Timstein	2796	12545	41.5	59.4	15.2	14.5	72.9	.61	29.0	67	2.5	0	778	776	783	152	83
Premier x Timstein	2798	12547	31.9	59.1	16.2	15.1	69.5	.72	24.3	67	1.5	0	545	541	553	158	58
Average Range		37.3	59.6	15.5	14.6	14.6	72.5	.58	28.9	68	2.5	0.7	840	806	846	153	82
		11.0	3.4	1.6	1.7	4.6	4.6	.25	15.3	8	1.5	2.0	363	322	355	10	34



## Crookston, Minnesota

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion	Mixing Time	Opti- mum Bro- mate	Methods & Volume			Average		
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best	Cc	Opti- mum	Wgt. of Loaf	Crumb Color
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Cc	Grams	Score	Score
Timstein x Newthatch	2797	12634	23.0	57.5	15.6	14.5	73.3	.44	31.8	70	3.0	1	995	949	995	151	85	92
Hope x Timstein	2796	12545	27.1	57.6	14.6	13.6	72.0	.42	36.0	70	3.0	2	896	897	977	154	90	85
Hope x Timstein	2789	12546	21.3	57.8	15.0	14.4	72.8	.47	31.3	69	2.5	2	934	925	965	152	87	85
Cadet		12053	31.1	57.7	15.4	14.5	71.7	.46	32.8	68	2.0	1	953	939	953	152	85	97
Redman		12496	22.3	56.5	15.3	14.5	74.6	.45	41.5	67	2.0	2	911	924	943	152	88	88
Pilot		11945	29.3	58.6	15.0	13.7	71.4	.44	34.2	63	2.0	1	942	920	942	150	80	97
Mida		12008	25.3	60.0	15.5	14.5	72.9	.45	39.0	66	1.5	1	940	908	940	152	83	97
Thatcher		10003	33.9	58.5	14.2	13.6	73.7	.43	38.2	65	2.0	2	905	881	931	149	73	90
Rival		11708	30.4	58.7	14.3	13.5	71.2	.43	38.3	68	2.5	1	916	902	916	152	83	90
Hope x Timstein	2776	12488	30.1	58.2	15.7	14.7	72.0	.41	34.9	69	2.0	2	824	866	916	156	88	87
Merit x Thatcher	2104	12540	32.6	59.0	14.2	13.1	69.6	.45	29.0	67	2.0	1	885	874	885	150	93	95
Mida x Cadet	1831	12363	30.2	59.0	14.5	13.4	74.8	.47	37.3	64	2.0	1	873	865	873	150	85	93
Henry		12265	31.6	58.0	13.2	12.1	75.0	.41	43.8	62	2.0	2	830	853	870	150	70	88
Pilot x Mida	1756	12303	39.2	60.3	13.7	12.9	71.3	.40	40.5	63	2.0	1	833	825	833	150	83	88
Premier x Timstein	2798	12547	23.3	58.1	14.5	13.5	71.8	.49	33.3	68	2.0	1	775	747	775	156	77	75
Average			28.7	58.4	14.7	13.8	72.5	.44	36.1	67	2.2	1.4	894	885	914	152	83	90
Range			17.9	3.8	2.5	2.6	5.4	.09	14.8	8	1.5	1.0	220	202	220	7	23	22

## Fargo, North Dakota

Rushmore	S.D. 2280	12273	26.1	59.4	13.9	13.2	74.3	.51	33.6	68	3.0	2	848	847	859	152	85	90
2744 x 2809	Ms. 3261	12619	24.8	58.3	14.0	13.2	70.4	.51	32.5	69	2.0	1	859	821	859	155	85	87
Hope x Timstein	M. 2776	12488	27.4	59.6	13.7	12.8	71.5	.55	32.2	68	3.0	1	842	827	842	151	88	90
Rival		11708	27.3	59.7	13.2	11.6	75.2	.59	27.3	69	3.0	1	812	790	812	155	85	88
Henry		12265	31.7	59.4	12.0	10.9	76.2	.53	36.2	64	2.5	1	798	773	798	154	78	85
Ceres		6900	27.2	60.7	12.6	11.9	73.2	.52	26.9	69	3.5	1	795	774	795	154	78	90
Premier		11940	25.7	60.8	13.2	12.5	74.9	.60	29.4	69	3.0	1	795	767	795	156	85	83
1556 x 1563	1840	12431	26.1	58.2	12.6	11.5	72.0	.43	33.1	66	2.5	2	772	766	789	153	88	88
Power		3697	26.2	60.4	12.5	11.6	73.1	.51	31.0	65	2.0	2	755	771	787	152	78	88
Thatcher		10003	28.6	59.5	13.4	12.7	73.1	.59	29.8	66	3.0	1	784	778	784	152	78	88
Redman		12496	24.9	58.2	12.8	12.1	71.7	.53	32.6	64	3.0	1	784	769	784	150	80	85
1552 x Mida	1924	12482	28.1	60.3	12.7	11.7	73.6	.54	33.6	66	2.5	2	769	769	784	153	78	90
Cadet		12053	26.7	58.0	12.8	12.3	72.0	.55	26.9	69	3.0	1	778	760	778	156	88	90
Mida		12008	27.1	60.0	12.6	11.7	74.2	.46	32.4	65	2.5	1	772	743	772	153	90	88
Mida x Cadet	1831	12363	30.6	58.7	11.7	10.7	75.7	.51	30.4	65	2.5	1	758	743	758	154	82	90
Pilot		11945	29.9	59.5	12.0	11.0	72.0	.50	28.0	64	2.5	1	755	736	755	152	87	87
Merit x Thatcher	2104	12340	28.0	60.0	12.7	11.8	71.4	.55	24.7	69	3.0	1	750	729	750	153	85	87
Marquis		3641	26.5	60.3	12.1	11.1	73.0	.56	28.4	65	3.0	1	747	727	747	151	83	83
Pilot x Mida	1756	12303	31.1	60.2	11.7	10.9	75.2	.42	33.7	64	2.5	2	709	713	720	153	88	87
Average			27.6	59.5	12.7	11.9	73.3	.52	30.7	67	2.7	1.3	783	769	788	153	84	88
Range			6.9	2.8	2.3	2.5	5.8	.18	11.5	5	1.5	1.0	150	134	139	6	12	7



Table 3 - Continued

## Mandan, North Dakota

Variety or Cross	State or N. No.	C. I. No.	Acre Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion	Mixing Time	Opti- mum Bro- mate	Methods & Volume			Average		
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best	Cc	Cc	Wgt. of Loaf	Crumb Color
Pilot		11945	25.8	58.3	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Cc	Grams	Score	Score
C. x H. T. F.	1556	12263	33.1	62.0	16.0	15.2	70.7	.45	27.6	67	2.0	2	1009	1005	1044	152	78	88
Thatcher		10003	28.2	58.9	16.4	15.8	73.8	.46	37.3	70	2.0	3	928	994	1041	160	85	88
Hope x Timstein	M. 2776	12488	39.6	60.9	16.3	15.6	72.2	.40	32.9	68	2.5	2	995	1012	1032	153	80	85
Mida x Cadet	1831	12363	32.3	61.0	17.1	16.5	72.5	.45	34.8	70	3.0	2	906	966	1021	154	90	87
Cadet		12053	29.4	59.9	16.1	15.7	76.5	.49	34.1	69	2.0	2	956	991	1018	154	85	88
Rival		11708	27.1	60.4	16.3	15.6	73.2	.51	28.8	71	2.0	1	1012	972	1012	158	88	85
Mida		12008	33.0	62.3	15.6	14.9	76.3	.51	28.7	70	2.5	2	916	946	983	155	75	85
Rushmore	S. D. 2280	12273	39.7	61.2	16.4	15.8	75.6	.45	34.1	68	2.0	3	928	953	977	153	92	87
Pilot x Mida	1756	12303	31.8	62.3	16.1	15.6	75.2	.42	40.1	68	2.5	2	906	925	948	150	78	83
					15.6	15.0	75.1	.44	31.7	66	2.0	1	933	887	933	154	85	92
Average		32.0	60.7	16.2	15.6	74.1	.46	33.0	69	2.3	2.0	2.0	949	935	1001	154	84	87
Range		13.9	4.0	1.5	1.6	5.8	.11	12.5	5	1.0	2.0	2.0	106	125	111	10	17	9

## Dickinson, North Dakota

C. x H.T.F.	1556	12263	32.7	62.2	15.7	15.0	72.9	.44	33.2	56	2.0	2	818	882	931	152	90	90
Hope x Timstein	M. 2776	12488	32.2	61.8	16.1	15.3	73.8	.50	32.0	69	2.5	1	882	830	882	151	87	87
Redman		12496	31.4	61.4	14.0	13.9	75.2	.46	30.4	67	2.5	2	824	834	882	150	87	88
Rescue		12436	32.7	62.1	14.3	14.0	73.9	.45	35.8	64	2.0	2	842	854	868	148	78	88
Rushmore	S.D. 2280	12273	28.0	61.6	15.0	14.7	75.1	.42	32.6	66	2.5	1	865	847	865	148	80	90
Marquis		3641	34.5	62.1	13.8	13.4	74.6	.49	32.1	66	2.5	2	856	844	865	152	83	93
Regent x Mida		12542	32.5	62.8	14.6	14.1	74.2	.39	32.1	66	2.5	2	839	844	862	150	82	85
Mida		12008	35.9	63.5	15.0	14.3	76.4	.49	31.4	66	2.0	1	856	844	856	152	92	95
Red Fire		3329	34.5	62.4	13.8	13.3	72.9	.47	32.2	64	2.0	2	845	816	853	150	80	88
Pilot x Merit	2012	12493	36.0	61.9	14.7	13.9	72.8	.48	27.9	68	2.5	0	821	836	851	152	90	93
Thatcher		10003	33.0	61.2	14.5	14.0	74.6	.42	29.2	66	2.0	1	839	826	839	149	82	90
Rival		11708	35.8	62.0	15.0	13.2	76.2	.41	28.0	68	2.5	2	827	815	839	151	83	88
Vesta		11712	36.3	62.8	13.5	13.0	76.9	.48	30.8	67	3.0	2	812	800	833	150	88	87
Ceres		6900	36.3	62.3	14.2	13.4	71.2	.51	28.1	67	2.5	0	795	873	830	152	78	90
Cadet		12053	37.8	60.4	13.9	13.5	74.6	.44	25.9	68	2.5	2	804	812	824	153	85	90
1552 x Mida	2083	12543	37.5	63.6	14.1	13.4	75.1	.44	31.9	64	2.0	2	809	802	818	150	78	88
Pilot		11945	39.8	61.1	13.7	12.7	73.9	.41	28.2	65	2.0	0	809	802	812	150	83	90
Pilot x Mida	1756	12303	39.9	63.6	14.1	13.4	73.8	.46	31.7	63	2.0	0	781	790	812	150	87	87
Mida x Cadet	1831	12363	39.6	62.9	13.7	13.0	75.9	.42	30.2	65	2.0	1	804	788	804	150	75	92
1552 x Mida	1924	12482	36.7	63.7	13.6	13.0	75.5	.47	31.7	64	2.0	1	804	787	804	149	75	88
Haynes Bluesten		2874	34.9	60.4	13.3	12.5	72.3	.42	30.5	60	1.5	2	792	795	801	148	73	90
Average		35.1	62.2	14.3	13.7	74.4	.45	30.8	66	2.2	2.2	1.3	825	824	844	150	83	89
Range		11.9	3.3	2.8	2.8	5.7	.12	9.9	9	1.5	2.0	2.0	101	95	130	5	19	10

## Langdon, North Dakota

Variety or Cross	State or N. No.	C. I. Acre No.	Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion	Mixing Time	Opti- mum Bro- mate	Methods & Volume			Average		
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3	Opti- mum	Wgt. of Loaf	Crumb Color	Grain Texture
Bu.				Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Cc	Grams	Score	Score	
Pilot		11945	46.3	61.7	13.8	12.8	72.8	.45	27.6	68	2.0	0	903	899	919	153	88	90
Mida x Cadet	1831	12363	52.7	61.9	13.4	12.7	77.5	.50	32.1	69	2.5	1	892	858	892	156	82	90
Thatcher		10003	45.0	61.9	13.9	13.4	75.3	.44	30.8	66	2.5	1	885	852	885	153	75	88
Redman		12496	44.8	62.0	13.8	13.6	76.6	.48	34.8	67	2.5	1	885	850	885	156	83	85
Hope x Timstein	M. 2776	12488	51.5	62.7	14.4	14.0	74.9	.49	31.6	70	3.0	1	859	831	859	157	87	88
Rival		11708	52.2	62.6	13.2	12.7	76.9	.53	29.2	68	2.5	1	856	804	856	157	82	87
Pilot x Merit	1898	12442	44.7	61.5	13.3	12.7	73.6	.50	24.3	71	3.0	1	845	814	845	158	82	88
1691 x 1756	2105	12541	48.0	62.7	13.4	12.7	76.0	.48	32.3	68	2.0	1	830	804	830	158	88	92
Mida		12008	48.2	62.8	14.6	13.8	75.1	.52	32.4	69	2.5	1	809	789	809	156	88	92
Cadet		12053	47.2	60.5	13.7	13.2	73.4	.52	27.5	70	2.5	1	806	789	806	156	87	88
Pilot x Mida	1756	12303	51.7	63.3	13.2	12.5	75.1	.44	31.4	66	2.0	0	795	776	803	154	88	90
Average			48.5	62.1	13.7	13.1	75.2	.49	30.4	68	2.5	0.8	851	824	854	156	85	89
Range			8.0	2.8	1.4	1.5	4.7	.09	10.5	5	1.0	1.0	108	123	116	5	13	7

## Edgeley, North Dakota

Hope x Timstein	M. 2776	12488	22.1	60.1	14.8	14.0	75.1	.54	33.3	70	3.0	2	833	866	910	154	87	92
Rival		11708	24.9	60.2	14.1	13.4	78.2	.51	31.5	71	3.0	3	824	874	900	154	82	95
Rushmore	S.D. 2280	12273	21.2	59.7	13.7	13.1	75.2	.53	32.4	69	4.0	2	853	838	879	152	80	90
Spinkota		12499	27.7	62.2	15.4	14.4	73.7	.51	40.5	63	2.0	3	803	854	876	150	80	90
Redman		12496	22.3	59.5	13.3	12.7	74.0	.48	41.3	68	3.0	3	806	840	871	152	82	93
Merit x Thatcher	2104	12540	28.4	61.0	13.2	12.4	74.0	.56	23.5	72	3.5	2	842	833	865	155	83	95
Cadet		12053	24.0	58.7	13.3	12.6	72.1	.45	26.9	68	3.0	2	803	841	865	152	85	92
Mida		12008	24.6	61.6	14.6	13.6	74.7	.50	33.6	68	2.5	1	854	822	854	152	90	85
Thatcher		10003	24.1	59.6	13.4	12.7	73.8	.48	27.1	68	3.0	1	842	812	842	153	72	88
Henry		12265	26.7	60.6	12.7	12.0	76.6	.50	36.5	64	2.5	3	807	821	833	151	75	90
Mida x Cadet	1831	12363	25.7	60.1	12.0	11.2	75.6	.55	30.4	68	3.0	2	786	790	812	150	80	92
Pilot		11945	27.1	59.9	12.3	11.3	73.2	.43	27.4	65	2.5	0	780	771	792	150	80	88
Pilot x Mida	1756	12303	23.5	60.7	11.7	10.9	75.4	.46	33.4	65	2.5	2	722	737	752	151	87	82
Average			24.8	60.3	13.4	12.6	74.7	.50	32.1	68	2.9	2.0	812	823	850	152	82	90
Range			7.2	3.5	3.7	3.5	6.1	.13	17.8	9	2.0	3.0	132	137	158	5	18	13



Table 3 - Continued

## Minot, North Dakota

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearling Index Value	Absorption	Mixing Time	Optimum Moisture	Methods & Volume		Wgt. of Loaf	Average Crumb Color Texture	
					Wheat	Flour	Yield	Ash					No. 6	Best		Score	Score
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Grams	Score	Score
Regent		11869	23.3	60.2	15.4	14.6	72.6	.44	35.1	67	2.0	3	879	933	974	155	85
Rescue		12436	26.4	60.8	14.6	14.0	73.8	.44	38.0	66	2.0	2	939	943	968	153	85
Cadet		12053	25.9	59.0	14.7	14.1	71.2	.49	28.9	71	2.5	2	913	935	954	156	87
Redman		12496	30.7	60.4	14.7	13.8	74.1	.43	33.8	69	2.0	2	883	907	945	154	87
1552 x Mida	1924	12482	29.0	61.6	14.2	13.5	75.5	.50	34.7	72	2.0	2	859	908	942	155	83
Mida x Cadet	1831	12363	25.4	60.8	14.6	13.8	75.4	.49	33.0	71	2.5	2	908	924	939	156	88
Thatcher x Apex	Sask. 2176	12639	18.6	59.7	14.9	14.2	71.3	.49	32.1	67	2.0	2	901	907	922	155	87
Henry		12265	21.1	60.6	13.7	12.7	74.1	.43	38.0	67	2.0	3	848	895	927	154	73
Pilot		11945	27.0	59.7	14.9	13.8	70.7	.46	27.1	65	2.0	2	903	896	917	150	85
Ceres		6900	19.5	61.0	14.8	14.0	74.3	.48	29.9	71	2.5	3	893	904	909	155	77
Rival		11708	21.4	60.8	15.0	14.1	74.5	.53	32.8	70	2.5	1	890	851	890	154	78
Mida		12008	31.1	62.3	15.0	14.3	73.7	.50	32.6	73	2.5	1	885	863	885	157	85
Thatcher		10003	32.6	60.5	14.9	14.3	73.6	.50	30.1	66	2.0	1	885	829	885	152	75
Pilot x Mida	1756	12303	28.0	62.6	14.0	13.2	74.1	.39	34.1	65	2.5	1	882	821	882	152	88
Hope x Timestone	M. 2776	12488	30.4	60.9	15.4	14.7	74.6	.49	30.8	70	2.5	2	821	837	845	157	80
Average		26.0	60.7	14.7	13.9	73.6	.47	32.7	32.7	69	2.2	1.9	886	890	919	154	82
Range		14.0	3.6	1.7	2.0	4.8	.14	10.1	10.1	8	0.5	2.0	118	122	129	7	15

## Williston, North Dakota

Ceres		6900	33.3	62.8	15.0	14.3	75.1	.46	29.9	72	2.5	1	925	893	925	156	78
Rescue		12435	31.4	61.9	14.4	14.0	76.8	.49	39.1	66	2.0	3	882	907	920	152	87
Cadet		12053	32.6	60.1	14.7	14.2	74.9	.52	31.7	71	2.5	2	874	872	911	153	87
Hope x Timestone	M. 2776	12488	32.7	62.0	15.3	14.9	75.4	.47	36.5	70	2.5	1	894	863	894	157	90
Thatcher		10003	36.8	61.6	14.2	13.6	76.3	.57	32.4	68	2.5	3	856	874	883	155	80
Vesta		11712	37.6	62.4	13.8	13.2	77.9	.46	33.5	69	2.5	2	839	857	883	154	88
Pilot		11945	35.8	61.7	14.2	13.3	74.3	.62	31.6	66	2.0	1	874	868	874	150	85
Mida		12008	30.9	63.1	15.0	14.4	76.6	.56	36.3	67	2.0	1	873	841	873	153	88
Rival		11708	33.5	61.9	13.6	13.0	76.6	.57	31.3	71	3.0	3	812	843	862	155	80
Redman		12496	31.4	61.2	15.0	14.1	76.8	.46	38.8	69	3.0	1	848	820	848	156	83
Mida x Cadet	1831	12363	35.8	62.1	13.8	13.1	76.9	.48	32.0	70	2.5	2	836	828	845	156	87
Average		33.9	61.9	14.5	13.9	76.1	.51	33.9	33.9	69	2.5	1.8	865	861	883	154	85
Range		6.7	3.0	1.7	1.9	3.6	.16	9.2	9.2	6	1.5	2.0	113	87	80	7	12



Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion	Mixing Time	Opti- mum Bro- mate	Methods & Volume		Average			
					Test Wgt.		Flour						No. 6	Best	Opti- mum	Wgt. of Loaf	Crumb Color	Grain Texture
					Wheat	Flour	Yield	Ash										
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Grams	Score		
Thatcher x Apex	Sask. 2176	12639	28.4	57.8	14.4	13.7	74.6	.56	35.7	65	2.5	1	1009	953	1009	150	85	
Mida x Cadet	1831	12363	32.1	57.8	14.6	13.8	74.3	.53	33.8	64	2.0	0	891	870	917	147	82	
Saunders		12567	28.6	57.2	13.7	12.9	74.0	.55	31.9	65	2.5	1	917	842	917	151	85	
Pilot x Mida	1756	12303	35.2	59.1	13.8	12.9	74.5	.48	35.3	63	2.0	0	908	853	914	149	85	
Ceres		6900	29.4	57.2	14.0	13.1	73.2	.58	29.7	67	3.0	0	862	853	908	153	72	
Thatcher		10003	31.9	57.5	14.2	13.6	73.6	.56	30.8	67	2.5	1	898	830	898	151	70	
H.R.P. x Clarendon	2202	12731	28.7	57.5	15.4	14.8	75.0	.50	38.6	63	1.5	0	875	876	883	149	82	
Pilot		11945	31.4	56.8	14.4	13.6	70.2	.53	32.1	65	2.0	1	868	836	868	150	77	
Cadet		12053	29.2	55.9	14.9	14.3	72.4	.57	31.3	66	2.5	1	865	846	865	153	80	
Hope x Timstein	M. 2776	12488	30.4	58.4	15.5	14.9	72.7	.65	31.9	66	2.5	0	853	819	862	149	82	
Rival		11708	31.0	56.7	14.7	13.8	73.8	.60	33.3	67	3.0	1	859	831	859	153	73	
H.R.P. x Clarendon	1147	12730	28.8	56.2	15.4	13.9	71.3	.52	45.5	60	2.0	0	830	809	850	149	72	
Mida		12008	28.8	57.6	14.8	13.8	74.4	.56	34.3	62	2.0	0	824	816	845	153	80	
Rushmore	2280	12273	32.1	58.2	14.9	14.2	73.6	.56	34.9	64	2.5	0	769	779	839	148	70	
H.R.P. x Clarendon	2149	12729	22.3	55.7	15.6	14.7	70.9	.57	36.6	63	1.5	1	830	798	830	151	65	
Triunfo x Thatcher	630	12625	27.9	58.3	15.3	14.0	73.4	.55	42.3	60	1.5	1	815	768	815	148	73	
Triunfo x Thatcher	339	12627	29.8	58.4	14.9	13.6	69.6	.51	41.1	60	1.0	2	807	806	813	152	70	
Merit x Pilot	1764	12315	31.8	56.4	14.1	13.0	71.2	.61	24.7	66	2.5	0	738	735	792	153	75	
Triunfo x Thatcher	354	12626	26.6	57.2	15.5	14.5	71.3	.57	30.0	62	1.5	0	738	740	766	152	70	
Thatcher x Triunfo	139	12727	28.4	58.0	15.4	14.3	71.2	.46	35.1	60	1.0	2	743	746	758	152	73	
Thatcher x Triunfo	343	12497	33.1	58.7	15.2	13.6	69.8	.52	41.4	60	1.0	2	715	737	758	148	73	
H.R.R. x Mercury	1691	12499	26.3	55.5	15.8	14.7	69.6	.59	33.2	62	2.0	1	752	698	752	151	55	
H.R.P. x Clarendon	1091	12728	24.6	54.5	16.3	14.5	69.1	.58	42.5	60	1.0	0	715	706	729	149	53	
Average			29.4	57.2	14.9	13.9	72.3	.55	35.0	63	2.0	0.7	830	806	846	150	73	
Range			12.9	4.6	2.6	2.0	5.4	.19	20.8	7	2.0	2.0	294	247	280	6	31	

Table 3 - Continued

Eureka, South Dakota

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearling Index Value	Absorption	Mixing Time	Optimum Bro. matc	Methods & Volume		Wgt. of Leaf	Average		
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best		Cc	Cc	Crumb Color
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Grams	Score	Score	
Triunfo x Thatcher	339	12627	19.5	59.2	15.2	14.4	71.2	.48	41.4	60	2.0	2	883	905	931	149	82	92
Mida x Cadet	1831	12363	23.9	58.7	14.5	13.9	73.6	.47	34.2	63	2.0	2	874	878	908	148	80	88
Pilot x Mida	1756	12303	22.4	58.4	14.9	14.3	72.7	.51	37.8	62	2.0	2	848	867	906	147	80	92
Thatcher		10003	20.8	57.5	15.3	14.7	72.2	.57	35.4	65	2.5	2	874	866	905	149	78	87
Cadet		12053	22.0	57.7	15.1	14.4	71.3	.54	40.3	66	2.0	3	868	881	894	153	78	88
Rushmore	2280	12273	23.5	58.6	15.7	14.7	72.5	.52	44.8	62	2.0	1	888	864	888	149	77	90
Hope x Timstein	M. 2776	12488	20.7	58.3	15.8	15.0	72.3	.51	37.8	63	2.0	1	885	875	885	148	83	92
Triunfo x Thatcher	354	12626	25.5	57.8	15.6	15.0	72.4	.54	37.4	62	1.5	2	865	875	882	149	80	88
Thatcher x Apex	Sask. 2176	12639	19.9	58.9	14.1	13.6	74.3	.47	36.4	60	2.5	2	848	342	859	150	83	90
Rival		11708	32.3	57.5	15.3	14.5	74.2	.57	36.8	63	2.5	2	836	835	859	149	80	92
Mida		12008	24.3	58.8	14.8	14.4	76.0	.54	37.0	60	2.5	1	850	314	850	148	82	93
Triunfo x Thatcher	630	12625	22.3	58.2	15.4	14.4	73.0	.50	42.6	60	1.5	2	845	341	848	149	82	87
Ceres		6900	19.9	59.3	14.6	13.9	73.9	.45	36.7	63	2.5	1	845	834	845	151	88	93
Saunders		12567	21.9	58.0	14.9	13.8	73.0	.49	37.7	62	2.5	1	845	819	845	150	82	90
Pilot		11945	30.7	59.6	13.9	13.1	74.0	.50	36.2	63	2.0	2	818	816	830	151	85	92
H.R.R. x Mercury	1691	12499	19.6	57.3	15.7	14.9	69.5	.54	37.9	64	2.0	1	821	810	821	149	80	85
Average			23.1	58.3	15.1	14.3	72.9	.51	38.2	62	2.1	1.7	856	851	872	149	81	90
Range			12.8	2.0	1.9	1.9	6.5	.12	10.6	6	1.0	2.0	70	95	110	6	11	8

## Highmore, South Dakota

Ceres		6900	23.5	57.6	14.9	14.3	72.9	.49	30.5	65	2.5	1	925	900	925	151	85	90
Thatcher x Apex	Sask. 2176	12639	24.7	57.0	14.5	13.9	72.8	.51	31.2	63	2.0	1	919	881	919	148	88	88
Rushmore	2280	12273	23.9	56.2	15.2	14.3	74.6	.54	36.9	63	2.5	1	894	857	894	147	75	90
Hope x Timstein	M. 2776	12488	27.1	56.1	15.1	14.0	73.2	.56	34.5	63	2.5	1	888	866	888	147	83	90
Rival		11708	16.0	55.6	15.1	14.3	74.5	.54	31.7	65	2.5	2	824	833	865	152	75	92
Cadet		12053	22.3	56.5	14.9	14.3	71.2	.49	34.5	66	2.5	0	845	830	853	150	92	93
Mida x Cadet	1831	12363	25.1	57.5	14.0	13.7	74.2	.49	32.6	62	2.0	1	848	811	848	148	90	90
Triunfo x Thatcher	354	12626	25.1	57.4	15.6	14.8	72.4	.50	47.9	60	1.5	2	806	824	845	148	78	88
Mida		12008	25.5	57.8	14.3	13.4	73.7	.48	35.5	62	2.0	0	824	803	836	148	92	92
Pilot		11945	23.9	57.5	14.5	13.5	71.9	.45	31.9	63	2.0	1	836	785	836	150	88	93
Thatcher		10003	25.9	57.5	15.2	14.5	72.2	.51	33.2	64	2.0	0	804	785	830	150	78	90
Triunfo x Thatcher	339	12627	23.5	57.2	16.0	14.9	71.2	.53	48.3	58	1.5	2	718	780	827	150	75	83
Pilot x Mida	1756	12303	27.1	58.4	14.8	13.8	73.3	.47	35.0	60	2.0	0	815	795	821	146	90	90
Saunders		12567	18.4	55.5	13.9	13.1	73.2	.55	34.6	62	2.0	2	809	799	813	149	73	85
Triunfo x Thatcher	630	12625	20.3	57.8	15.1	13.8	71.7	.50	46.7	58	1.5	2	789	781	789	148	75	83
H.R.R. x Mercury	1691	12499	22.7	55.7	15.9	14.9	70.4	.52	37.1	62	2.0	0	760	736	789	148	72	80
Average		23.4	57.0	14.9	14.1	14.1	72.7	.51	36.6	62	2.1	1.0	832	817	849	149	82	89
Range		11.1	2.9	2.1	1.8	1.8	4.2	.11	17.8	8	1.0	2.0	207	164	136	6	20	13



Table 3 - Continued.

Newell, South Dakota

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearling Index Value	Absorption	Mixing Time	Optimum Moisture	Methods & Volume		Wgt. of Loaf	Average	
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best		Crumb Color	Texture
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Grams	Score	Score
Hope x Timstein	M. 2776	12488	13.9	58.1	16.4	16.1	76.7	.54	36.2	70	3.0	2	868	909	931	154	93
Mida		12008	17.8	60.0	15.6	14.8	75.4	.50	34.9	68	2.0	2	839	871	908	152	92
C. x H.T.F.	1556	12363	13.9	57.1	15.3	14.3	74.1	.50	35.5	69	3.0	3	882	894	903	153	88
Pilot x 1514	2014	12476	19.2	58.9	13.9	13.0	75.8	.52	30.8	67	2.5	2	886	878	903	150	90
Thatcher		10003	17.1	57.8	14.6	14.1	75.0	.49	31.4	66	2.5	2	891	885	899	150	92
Cadet		12053	18.6	58.0	14.0	13.5	75.4	.55	28.0	69	2.5	2	842	856	881	152	88
Rushmore	2280	12273	16.4	57.4	14.5	13.9	76.3	.55	36.8	65	3.5	3	789	846	856	149	93
Pilot		11945	18.4	58.6	13.4	12.4	75.3	.52	30.2	65	2.0	0	845	835	851	151	85
Pilot x Mida	1953	12445	17.7	61.0	13.0	12.1	75.1	.46	30.0	66	2.5	1	781	751	781	153	80
Pilot x Merit	1898	12442	17.8	58.8	11.4	10.3	73.8	.93	28.4	66	2.5	1	747	711	747	154	85
Mida x Cadet	1831	12363	15.6	58.6	10.4	9.6	75.5	.96	29.9	65	2.5	1	721	716	721	153	80
Pilot x Mida	1756	12303	18.7	60.2	10.5	9.8	76.6	.66	33.5	62	2.0	0	657	658	689	152	90
Average			17.1	58.7	13.6	12.8	75.4	.62	32.1	67	2.5	1.6	812	816	839	152	85
Range			5.3	3.9	6.0	6.5	2.9	.50	8.8	8	1.5	3.0	234	251	242	5	15

1/ High ash content due to dirt in sample.

Moccasin, Montana

Rescue		12435	26.0	60.3	15.6	15.6	70.9	.49	31.9	63	2.0	1	953	903	953	148	78
Pilot		11945	30.2	58.2	15.5	14.6	71.7	.46	25.3	65	2.5	1	889	866	389	151	82
Thatcher		10003	35.0	58.7	15.6	15.1	68.8	.46	22.6	67	3.0	0	846	846	374	150	73
Merit x Pilot	1860	12355	33.1	58.8	14.9	14.6	72.5	.58	22.9	69	2.5	2	836	852	873	154	83
Hope x Timstein	M. 2776	12488	29.3	58.9	14.8	15.0	71.5	.50	28.1	66	3.0	1	868	819	368	150	85
Cadet		12053	30.0	58.2	15.3	15.2	69.5	.54	26.0	69	3.0	1	850	823	850	154	88
Tall Thatcher		12628	25.5	59.2	15.2	14.8	70.9	.42	30.8	65	2.0	1	842	814	342	152	72
Mida x Cadet	1831	12363	31.5	60.1	14.6	14.0	72.8	.49	27.1	66	2.5	1	830	797	830	153	80
Pilot x Mida	1756	12303	28.2	61.5	14.9	14.6	72.3	.48	27.0	64	2.0	0	786	787	812	150	82
Mida		12008	31.3	60.4	13.6	13.0	73.4	.47	25.7	64	2.5	0	747	736	755	153	78
Average			30.0	59.4	15.0	14.7	71.4	.49	26.7	66	2.5	0.8	845	824	855	152	80
Range			9.5	3.3	2.0	2.6	4.6	.16	9.3	6	1.0	2.0	206	167	198	6	13



Table 3 - Continued.

Sheridan, Wyoming

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion	Mixing Time Min.	Opti- mum Bro- mate Mg.	Methods & Volume		Wgt. of Loaf	Average				
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best		Cc	Cc	Opti- mum	Crumb Color	Grain Texture
Pilot.	1098	11945	39.1	60.1	15.7	15.0	73.1	.58	31.2	68	2.5	1	971	932	971	152	78	87		
1750 x 1753	2095	12551	36.2	62.5	16.6	15.7	73.5	.53	33.0	69	2.5	1	948	912	948	151	88	90		
Hope x Timstein	M. 2776	12488	36.7	61.9	14.8	14.1	71.5	.50	34.7	69	2.5	1	906	857	906	154	90	90		
Pilot x Mida	1785	12647	42.3	61.3	15.4	14.8	74.9	.45	37.1	67	2.0	1	905	873	905	152	90	90		
Thatcher		10003	33.8	61.5	15.7	15.1	73.1	.44	32.6	66	2.0	0	818	816	877	151	73	87		
Regent x 1582	1912	12446	33.5	61.3	13.8	13.3	76.1	.55	34.9	66	2.0	1	876	837	876	152	72	87		
Merit x Pilot	1860	12355	33.9	60.7	14.1	13.4	72.2	.50	26.9	72	2.5	1	873	846	873	154	80	88		
1691 x 1756	2105	12541	40.0	61.7	15.2	14.4	74.4	.51	36.2	65	1.5	1	868	856	868	150	80	90		
Ceres x H.T.F.	1556	12263	39.1	59.1	14.7	14.0	73.4	.57	37.6	69	2.5	1	868	831	868	153	77	83		
1750 x 1753	2093	12550	35.3	61.7	15.5	14.9	71.4	.64	31.6	67	1.5	1	862	818	862	152	88	88		
Rushmore	S.D. 2280	12273	36.1	61.7	14.2	13.8	74.1	.50	36.8	67	2.5	1	859	835	859	152	80	92		
1552 x Mida	1924	12482	44.6	62.5	13.8	13.3	74.9	.53	36.1	68	2.0	1	853	833	853	154	75	85		
Pilot x Mida	1953	12445	36.7	63.1	15.2	14.5	74.8	.52	33.4	69	2.0	1	853	826	853	154	85	85		
Mida		12008	38.2	62.0	15.7	14.9	73.7	.45	35.6	70	2.0	0	839	821	851	158	92	90		
Pilot x Merit	1898	12442	37.0	61.0	13.7	13.1	72.7	.53	27.5	71	3.0	0	839	813	850	158	82	85		
Merit x Pilot	1764	12315	42.0	60.5	13.9	13.4	72.3	.53	26.0	72	3.5	0	836	820	845	156	82	85		
Pilot x 1514	2014	12476	40.2	62.3	14.6	13.4	69.3	.54	33.1	67	2.5	0	824	802	833	150	73	85		
Pilot x Merit	1996	12648	44.6	60.8	12.8	12.1	76.6	.48	32.7	68	3.0	2	818	812	827	153	80	87		
2744 x 2809	Ms. 3175	12440	33.3	60.7	15.0	14.1	74.6	.55	33.9	69	2.5	1	824	816	824	150	82	93		
1691 x 1756	2035	12492	41.9	62.5	14.1	13.3	74.9	.50	33.7	66	2.0	1	821	797	821	151	85	90		
Pilot x Mida	1756	12303	43.4	63.1	13.3	12.5	73.3	.45	33.2	65	2.0	0	810	784	815	154	88	88		
Marquis		3641	40.8	62.2	13.4	12.8	73.0	.44	34.8	70	3.0	0	806	788	818	157	73	85		
Cadet		12053	40.4	60.7	13.0	12.4	72.7	.45	28.4	69	3.0	0	795	781	801	154	88	90		
Merit <sup>2</sup> x Thatcher	2104	12540	40.8	61.7	13.4	12.8	76.2	.69	25.6	70	2.5	1	800	781	800	155	78	85		
Mida x Cadet	1831	12363	40.2	61.9	12.7	11.8	74.7	.45	31.1	70	2.5	1	800	780	800	158	62	83		
1750 x 1753	2092	12549	36.6	61.9	14.5	13.9	74.1	.53	33.6	66	2.0	1	795	771	795	152	73	80		
Ceres		6900	37.4	62.3	12.6	11.9	72.0	.45	28.0	71	3.0	1	750	732	750	160	70	82		
Average		38.7	61.6	14.3	13.7	73.6	.51		32.6	68	2.4	0.7	845	821	350	154	80	87		
Range		11.3	4.0	4.0	3.9	7.3	.25		12.0	7	2.0	2.0	221	200	321	10	30	13		

Table 3 - Continued.

## Akron, Colorado

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearling Index Value	Absorption	Mixing Time	Optimum Moisture	Methods & No. 6		Avg. 3 Best	Volume Optimum		Wgt. of Loaf	Average Crumb Color Texture	
					Wheat	Flour	Yield	Ash					Cc	Cc						
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.								
Thatcher		10003	10.9	55.1	15.9	15.3	72.3	.58	31.4	66	2.0	2	931	927	948	150	80	87		
Hope x Timstein	M. 2776	12488	11.2	57.1	15.8	15.2	74.4	.53	38.4	67	2.5	2	939	926	945	152	90	90		
Reward		8182	6.6	59.3	16.6	15.8	70.9	.59	33.7	65	2.0	2	928	926	934	149	87	88		
Pilot		11945	13.7	54.7	15.1	14.0	69.2	.55	27.4	64	2.5	2	882	890	928	149	87	92		
Merit x Pilot	1764	12315	10.5	54.4	16.0	15.2	69.2	.64	24.8	69	3.0	1	913	887	913	152	83	87		
Cadet		12053	11.5	53.9	15.5	14.8	70.9	.63	29.8	68	2.5	2	903	901	903	152	87	88		
Pilot x Mida	1953	12455	11.2	58.5	14.2	13.5	71.7	.55	31.9	65	2.5	1	881	852	881	151	90	92		
C. x H.T.F.	1556	12263	8.5	54.6	15.5	14.6	69.9	.50	33.2	66	2.5	2	865	864	879	154	88	88		
Mida		12008	11.1	56.6	14.7	13.8	73.0	.57	33.9	64	2.5	1	824	811	824	152	77	87		
Pilot x Mida	1756	12303	10.3	57.3	14.8	13.9	69.9	.58	29.8	64	2.5	1	806	783	806	151	88	87		

Average

Range

			10.8	56.2	15.4	14.6	71.1	.57	31.4	66	2.5	1.6	887	877	396	151	86	89		
			7.1	5.4	1.8	2.3	5.2	.14	3.6	5	1.0	1.0	133	144	142	5	13	5		

Table 4 - Yield, milling, baking and chemical results for newer hard red spring wheats grown in single increase plots at two experiment stations in 1948.

Mandan, North Dakota

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion Pct.	Mixing Time Min.	Opti- mum Bro- mate Mg.	Methods & Volume			Average		
					Wheat	Flour	Yield	Ash					No. 6	Cc	Cc	Avg. 3 Best	Opti- mum Cc	Wgt. of Loaf
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.								
1764 x Henry	2211	12733	21.1	58.6	15.8	15.3	71.7	.52	37.4	69	2.0	1	965	922	965	155	78	87
Pilot <sup>2</sup> x Comet	1915		18.4	59.1	14.0	13.4	72.2	.56	35.4	66	2.0	1	912	835	912	154	85	87
Thatcher		10003	19.6	59.6	14.5	14.1	73.8	.64	34.7	66	2.5	1	874	848	874	153	73	90
1750 x 1753	2271		18.1	59.8	13.6	12.7	71.9	.59	32.0	70	2.5	0	812	810	865	153	87	83
Mida		12008	19.2	60.3	14.0	13.4	74.7	.54	37.5	65	2.0	0	839	826	856	152	90	88
Regent x Pilot	1920		17.5	58.0	13.6	13.0	74.9	.58	35.0	64	2.5	1	854	836	854	152	78	85
Pilot x Merit	2012	12493	18.4	58.7	13.4	12.8	73.7	.55	28.9	67	2.5	1	851	836	851	152	83	88
1764 x 1753	2213	12738	21.7	59.3	14.1	13.4	71.2	.49	33.8	67	2.0	1	851	832	851	150	85	87
Pilot <sup>2</sup> x Merit	2174	12732	22.4	57.6	12.6	11.7	73.6	.54	27.6	65	2.5	1	839	800	839	150	85	88
Pilot x Mida	1785	12647	16.1	59.4	13.5	13.1	75.3	.57	33.2	64	2.0	1	836	805	836	154	82	82
1750 x 1753	2092	12549	24.0	60.4	15.0	14.2	73.7	.59	35.7	64	1.5	1	830	809	830	151	77	83
Pilot x 1315	2061		15.1	58.6	14.7	12.1	72.5	.49	33.7	66	2.0	1	827	806	827	152	78	83
Pilot <sup>2</sup> x Thatcher	2030	12736	18.5	59.0	12.8	12.3	73.8	.50	33.1	65	2.0	1	827	800	827	151	80	87
1691 x 1756	2035	12492	14.9	58.7	14.0	13.4	72.2	.56	34.1	65	2.0	1	827	800	827	153	88	85
Pilot x 1514	1931		18.9	59.6	12.8	12.0	73.6	.55	34.0	65	2.0	0	815	793	824	153	82	85
1750 x 1753	2095	12551	21.7	60.3	14.9	14.0	71.6	.50	34.2	67	2.0	0	809	799	823	153	92	88
Pilot <sup>2</sup> x Merit	2164	12735	18.1	60.1	12.6	11.7	75.5	.56	26.6	65	2.5	1	821	780	821	153	73	85
1568 x Merit	2120		17.5	57.3	13.3	12.5	73.1	.49	29.6	65	2.5	2	769	778	806	151	83	87
1750 x 1753	2244		18.6	60.1	12.5	11.8	73.6	.56	30.2	67	2.5	0	738	711	753	154	80	78
1568 x Merit	2130		18.5	61.7	12.5	11.8	73.2	.50	28.9	69	3.0	0	723	721	729	155	78	80
1764 x 1750	2246	12737	20.1	58.6	14.0	13.2	70.8	.70	31.7	69	2.0	0	674	657	677	158	68	70
Average			19.0	59.3	13.6	12.9	73.2	.55	32.7	66	2.2	0.7	823	800	831	153	82	85
Range			9.1	4.4	3.3	2.5	4.7	.21	10.9	6	1.5	2.0	291	265	288	8	24	20



Table 4 - Continued.

## Langdon, North Dakota

(Arizona Increases, June 1 Seeding)

Variety or Cross	State or N. No.	C. I. No.	Acre Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion	Mixing Time	Opti- mum Bro- mate	Methods & Volume			Average		
					Wheat		Flour						No. 6	Avg. 3	Opti- mum	Wgt. of Loaf	Crumb Color	Grain Tex- ture
					Pct.	Pct.	Pct.	Pct.										
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Cc	Grams	Score	Score	
1750 x Timstein	2237	12734	24.6	59.3	15.1	14.6	72.1	.54	31.3	65	1.5	2	830	921	968	155	80	87
Henry x Cadet	2233	12781	21.3	59.4	15.3	14.7	72.9	.50	29.6	67	2.5	3	879	923	959	150	70	85
Henry x 1907	2242	12777	20.9	60.1	13.9	13.2	75.3	.54	27.3	64	2.0	2	871	907	945	152	80	87
Rival		11708	14.6	55.0	14.8	14.4	75.7	.57	22.2	68	3.5	2	922	912	937	150	75	85
Thatcher		10003	2.7	59.8	14.7	14.4	--	.50	27.2	66	2.5	3	916	923	927	149	70	87
Henry x Cadet	2239	12779	33.2	60.3	14.2	13.7	74.9	.53	29.2	67	2.5	2	833	879	925	153	77	87
1764 x Timstein	2236	12780	17.3	56.6	13.1	12.6	73.9	.56	22.2	69	3.5	1	862	830	862	152	80	83
Kwan Do-Pilot	2241	25.5	59.4	13.6	12.8	74.9	.55	24.6	24.6	64	2.0	2	795	830	859	153	70	82
Kwan Do-Pilot	2240	36.4	58.1	14.5	13.5	72.1	.44	28.9	28.9	67	1.5	3	750	810	842	153	78	82
1912 x 1919	2234	9.1	58.1	15.2	14.9	75.9	.54	25.3	25.3	64	1.5	2	749	793	821	152	68	82
Kwan Do-Pilot	2235	25.5	56.1	13.5	12.6	68.3	.54	25.3	25.3	60	1.5	3	735	777	801	148	67	82
1750 x Timstein	2238	27.3	57.6	13.8	13.4	74.5	.59	26.1	26.1	68	2.5	2	729	758	784	157	75	80
Average		22.0	58.3	14.3	13.7	73.7	.53	26.6	26.6	66	2.3	2.3	823	855	886	152	74	84
Range		35.5	5.3	2.2	2.3	7.6	.15	9.1	9.1	9	2.0	2.0	193	165	184	9	13	7

### UNIFORM REGIONAL NURSERY

Twenty-six wheats from the Uniform Regional Nursery have been tested for their milling, baking and chemical properties. The Eastern composite was composed of grain from eight stations and the grain from six dry-land stations made up the Western composite. The grain from three irrigated stations was not included nor tested. The results of the quality tests for the Eastern and Western composites and the average of both composites are shown in table 6. The discussion which follows is based on the average of the Eastern and Western composites. Acre yields ranged from 23.8 bu. for Marquis to 30.1 bu. for 1552 x Mida, N. 2083.

The test weights of the samples were high and only two of the strains averaged 58.5 pounds or lower. These were Redman and Timstein x Newthatch. Redman was one of the lower test weight samples among last year's nursery samples. Pilot x Mida, N. 1958; Thatcher x Surpresa, II-39-8; and Thatcher x Triunfo, SD 343, averaged highest in test weight among the 1948 Regional Nursery samples with N. 1953 averaging 62.0 pounds. The flour yields varied over a wide range.

A number of the samples averaged high in wheat protein. Those averaging 16.0 percent or higher were Hope x Timstein, II-39-46; Timstein x Newthatch, II-42-22; 1750 x 1753, N. 2115; and Ns 2744 x 2809, Ns 3282. The high protein content of a number of the strains was due, in part, to their low acre yields. Flour proteins average 0.6 percent lower than the wheat.

A number of the strains yielded a high percent of flour, some exceeding others with higher test weights, Redman, 1552 x Mida, N. 2083; and Pilot x Mida, N. 1953; Ns 2744 x 2809, Ns 3274, were highest in flour yield. Timstein x Newthatch, II-42-22; H.R.R. x Mercury, SD 1691; and 1449 x Pilot, N. 2088, were lowest in flour yield.

The milling characteristics were satisfactory for most of the varieties and strains. Thatcher x Triunfo, SD 343, was one of the softest textured strains among the Uniform Regional Nursery samples. This strain milled very soft, was difficult to sieve or bolt and produced a "fibrous and cottony like" flour. Thatcher x Triunfo also had a high pearling index value. Past years' tests of Thatcher x Triunfo have shown similar results. The pearling index values were lowest for Merit<sup>2</sup> x Thatcher, N. 2104, and Pilot x Merit, N. 1898, both being materially less than for Thatcher.

The flour ash content was generally high with only a few strains averaging in the desired lower range. Those lowest were 1449 x Pilot, N. 2088; Thatcher x W38-Hope, Wis. 246; 1691 x 1756, N. 2105; and Thatcher x Surpresa, II-39-8.

There was a rather narrow range in baking quality. Most of the loaf volumes were good considering the protein content of the varieties and



strains with the greatest percentage of them having optimum loaf volumes higher than 900 cc. The three strains having the highest average loaf volumes were Regent x Mida, 1843.41; Pilot x Merit, N. 1898; and 1750 x 1753, N. 2115. Two of the strains were poor in baking quality. One of these was Thatcher x Triunfo, SD 343, which was not only low in loaf volume, but also poor in grain and texture and crumb color. The other, Hope x Timestone, II-39-51, was poor in loaf volume and crumb color but had good grain and texture.

The water absorption of the flour varied over a wide range of 12.0 percent. Thatcher x Triunfo, SD 343, was lowest and Merit<sup>2</sup> x Thatcher, N. 2104, and Ns 2744 x 2809, Ns 3285, were highest.

Pilot x Merit, N. 1898; Merit<sup>2</sup> x Thatcher, N. 2104; and Ns 2744 x 2809, Ns 3284, had the longest dough mixing time and Thatcher x Triunfo, SD 343, and Thatcher x Surpresa, II-39-8, had the shortest. These mixing times were wider than those generally considered to be satisfactory for hard red spring wheat.

The response to oxidizing agents did not vary greatly among the 26 varieties and strains compared. About half of the varieties and strains required the same amount of oxidizing agents as Thatcher. Of the other samples, about one-third required less and the rest slightly higher amounts of oxidizing agents than Thatcher. All were within the range considered satisfactory for hard red spring wheat.

Probably the most all around outstanding strains tested this year from the Uniform Regional Nursery are Regent x Mida, N. 1843.41; Pilot x Merit, N. 1898; 1750 x 1753, N. 2115; Pilot x Mida, N. 1953; Ns 2744 x 2809, Ns 3282; 1691 x 1756, N. 2105; Merit<sup>2</sup> x Thatcher, N. 2104; and Thatcher x W38-Hope, Wis. 246.

Table 5 - Yield, milling, baking and chemical results on 26 wheats grown in the Uniform Regional Nursery for the Eastern Composite, Western Composite and the Averages of the Eastern and Western Composites in 1948.

Eastern Composite 1/

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion Pct.	Mixing Time Min.	Opti- mum Bro- mate	Methods & Volume		Average			
					Wheat	Pct.	Yield	Ash					No. 6	Avg. 3 Best	Wgt. of Loaf	Crumb Color	Grain Tex- ture	
Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Mg.	Cc	Cc	Grams	Score	Score			
Regent x Mida	1843-41	12542	28.8	60.7	15.6	15.1	75.4	.63	30.6	68	2.5	1	971	944	971	150	80	85
Pilot x Merit	1969	12490	33.3	60.4	14.8	14.2	73.4	.57	26.1	64	2.0	2	930	897	939	147	82	85
Pilot x Merit	1898	12442	31.9	59.6	15.2	14.6	74.5	.63	23.5	69	3.0	1	937	913	937	152	83	85
Redman	2115	12638	30.5	58.7	15.5	15.1	75.4	.61	31.1	66	2.0	2	878	893	931	150	78	83
1750 x 1753		12640	28.9	60.8	16.2	15.2	73.2	.60	34.3	68	2.5	0	908	880	919	153	85	87
Timstein x Newthatch	II-42-22	12634	27.9	58.5	16.2	15.6	72.3	.65	26.1	67	2.5	1	919	892	919	148	78	85
1449 x Pilot	2088	12491	27.5	60.8	14.8	14.0	70.8	.48	29.7	63	2.0	1	919	883	919	146	80	88
Hope x Timstein	II-39-46	12488	30.4	60.0	15.9	15.2	73.7	.61	30.0	68	2.5	1	918	881	918	151	85	88
Merit2 x Thatcher	2104	12540	30.3	59.3	15.2	14.6	74.6	.68	22.2	72	3.0	1	914	882	914	155	85	90
2744 x 2809	3284	12645	34.0	59.6	15.9	15.0	73.3	.64	26.0	70	3.0	0	898	868	911	150	82	85
Pilot x Mida	1953	12445	31.1	62.3	14.4	13.8	75.5	.55	28.7	64	2.0	1	901	868	901	149	85	88
2744 x 2809	3285	12646	30.9	59.4	15.6	14.6	74.4	.66	26.5	71	2.5	1	900	826	900	154	82	85
Hope x Timstein	II-39-47	12545	32.3	60.1	15.4	14.9	72.2	.60	28.6	68	2.5	0	883	850	396	151	85	82
2744 x 2809	3282	12644	29.4	59.4	15.8	15.0	74.0	.59	29.5	66	2.5	1	894	863	394	148	87	87
Marquis		3641	25.5	59.2	14.1	13.7	74.2	.62	30.0	63	2.0	1	893	854	393	150	73	83
Thatcher		10003	31.2	59.5	15.2	14.5	75.0	.59	27.6	66	2.5	1	892	859	392	150	85	83
1552 x Mida	2083	12543	32.2	60.7	14.5	14.0	75.4	.61	30.3	66	2.0	1	889	847	389	151	73	83
1691 x 1756	2105	12541	29.3	59.8	14.8	14.0	75.6	.56	31.7	65	2.0	1	888	867	388	151	87	90
Thatcher x Surpresa	II-39-8	12641	32.2	61.9	15.3	14.8	74.0	.56	30.9	65	1.5	1	879	845	379	151	73	87
Thatcher x W38-Hope	Wisc. 246	12649	33.5	59.0	15.2	14.7	73.5	.55	29.1	63	2.0	1	865	812	365	149	83	83
2744 x 2809	3274	12643	34.1	59.3	15.5	14.7	75.2	.60	31.1	63	2.0	1	865	847	365	148	85	90
Thatcher x Apex	2176	12639	29.3	60.4	14.9	14.4	76.0	.68	27.7	66	2.0	0	856	842	365	149	77	85
2744 x 2809	3269	12642	29.9	59.2	15.5	14.8	75.0	.63	31.0	66	2.0	1	856	840	856	151	85	87
Hope x Timstein	II-39-51	12546	30.5	60.5	15.5	15.1	74.1	.64	26.7	68	2.0	1	812	791	812	152	77	82
H.R.R. x Mercury	SD 1691	12499	25.6	58.5	16.0	14.8	71.6	.64	29.0	67	2.0	1	806	787	806	150	75	85
Thatcher x Triunfo	SD 343	12497	32.4	61.0	15.6	14.6	72.2	.62	33.5	60	1.5	1	747	710	747	151	78	75

Average			30.5	59.9	15.3	14.7	74.0	.61	28.9	66	2.2	0.9	885	855	989	150	81	85
Range			8.6	3.8	2.1	1.9	5.2	.20	12.1	12	1.5	2.0	224	234	224	9	14	15

1/ Average of eight Eastern stations - Madison, St. Paul, Waseca, Morris, Crookston, Langdon, Fargo and Brookings.



Table 5 - Continued

Western Composite 2/

Variety or Cross	State or N. No.	C. I. No.	Acre Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion Pct.	Mixing Time Min.	Opti- mum Bro- mate Mg.	Methods & Volume			Wgt. of Loaf	Average			
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best	Opti- mum Cc		Grams	Score	Crumb Color	Grain Tex- ture
Bu.																				
1750 x 1753	2115	12640	22.4	60.4	15.7	15.5	74.4	.55	32.5	70	3.0	1	1012	955	1012	151	78	85		
Pilot x Merit	1898	12442	24.0	59.0	16.1	15.4	71.9	.58	23.9	72	3.5	1	995	942	995	155	82	85		
Regent x Mida	1843.41	12542	24.5	60.0	16.1	15.6	73.6	.59	28.5	69	2.5	1	992	925	992	151	82	90		
Merit2 x Thatcher	2104	12540	24.1	60.0	15.7	15.3	73.8	.63	22.9	73	3.5	1	977	909	977	154	82	88		
2744 x 2809	3282	12644	24.4	59.4	16.2	15.5	73.6	.55	28.7	72	3.0	1	977	913	977	152	78	87		
1691 x 1756	2105	12541	24.2	59.8	15.3	14.8	73.5	.50	32.8	66	2.0	1	968	913	968	151	87	92		
Timstein x Newthatch	II-42-22	12634	21.9	57.5	16.4	16.1	70.6	.67	26.9	72	2.5	2	922	936	959	155	82	90		
2744 x 2809	3274	12643	25.2	59.3	15.9	15.4	75.2	.57	31.2	71	2.5	1	959	905	959	154	80	87		
1449 x Pilot	2088	12491	22.1	58.9	15.4	15.0	71.8	.52	30.2	65	2.5	1	959	892	959	148	68	83		
Pilot x Merit	1969	12490	26.2	59.5	15.2	14.6	72.5	.51	27.4	71	3.0	1	953	892	953	153	82	88		
Pilot x Mida	1953	12445	26.2	61.7	15.5	15.1	74.0	.53	30.8	67	2.5	1	950	882	950	152	78	90		
Thatcher		10003	24.5	58.6	15.9	15.6	73.2	.53	29.9	67	2.5	1	948	912	948	148	77	85		
Hope x Timstein	II-39-46	12488	26.6	59.0	16.4	16.0	73.4	.58	31.7	71	2.5	1	945	904	945	153	83	85		
Thatcher x W38-Hope	Wisc. 246	12649	26.3	58.9	15.1	14.7	73.3	.47	30.8	68	2.0	1	943	884	943	154	83	93		
Marquis		3641	22.1	59.0	15.2	14.8	72.0	.59	30.2	65	2.5	2	931	909	937	149	73	83		
Redman		12638	25.0	58.3	15.4	15.3	74.3	.52	33.3	68	2.5	1	937	874	937	152	82	83		
Thatcher x Surpresa	II-39-8	12641	26.7	61.2	15.6	15.4	75.3	.50	33.7	65	1.5	2	923	929	937	150	68	88		
Hope x Timstein	II-39-47	12545	26.4	59.1	16.0	15.7	73.6	.59	31.4	72	2.5	1	928	853	928	155	77	87		
Thatcher x Apex	2176	12639	24.7	60.0	15.3	14.9	73.0	.59	28.7	68	2.5	1	919	855	919	152	73	83		
2744 x 2809	3269	12642	23.4	59.1	16.1	15.8	74.1	.59	29.8	69	2.0	3	889	900	914	150	80	90		
1552 x Mida	2083	12543	28.0	60.5	15.4	14.9	74.4	.62	30.5	69	2.0	2	865	889	910	155	70	83		
2744 x 2809	3254	12645	25.0	59.4	15.8	15.3	72.9	.60	25.8	74	3.5	1	905	864	905	154	82	88		
H.R.R. x Mercury	SD 1691	12499	24.3	59.5	15.8	15.3	71.5	.55	30.3	70	2.5	1	876	837	876	152	75	85		
2744 x 2809	3285	12646	24.9	59.0	16.0	15.5	73.0	.59	27.8	74	3.0	1	870	814	870	154	83	88		
Thatcher x Triunfo	SD 343	12497	25.0	62.0	16.0	15.6	72.5	.73	35.5	62	1.0	3	652	737	798	151	67	73		
Hope x Timstein	II-39-51	12546	27.6	60.1	15.6	15.4	73.8	.61	29.0	69	2.0	2	778	787	795	154	73	82		
Average		24.8	59.6	15.7	15.3	73.3	.57		29.8	69	2.5	1.4	922	885	933	152	78	86		
Range		6.1	4.5	1.3	1.5	4.7	.26		12.6	12	2.5	2.0	360	218	217	7	20	20		

2/ Average of six Western stations - Mandan, Dickinson, Moccasin, Havre, Alliance and Akron.

Table 5 - Continued

Average of Eastern and Western Composite

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearl-Index Value	Absorp-tion	Mixing Time	Opti-mum Bro-mate	Methods & Volume		Wgt. of Leaf	Average	
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best		Crumb Color	Grain Texture
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	3c	Grams	Score
Regent x Mida	1843-41	12542	26.7	60.4	15.9	15.4	74.5	.61	29.6	69	2.5	1.0	982	935	982	151	81
Pilot x Merit	1898	12442	28.0	59.3	15.7	15.0	73.2	.61	23.7	71	3.3	1.0	966	928	966	154	83
1750 x 1753	2115	12640	25.7	60.6	16.0	15.4	73.8	.58	33.4	69	2.8	0.5	960	918	966	152	82
Merit x Thatcher	2104	12540	27.2	59.7	15.5	15.0	74.2	.66	22.6	73	3.3	1.0	946	896	946	155	84
Pilot x Merit	1969	12490	29.8	60.0	15.0	14.4	73.0	.54	26.8	68	2.5	1.5	942	895	946	150	82
Timstein x Newthatch	II-42-22	12634	24.9	58.0	16.3	15.9	71.5	.66	26.5	70	2.5	1.5	921	914	939	152	80
1449 x Pilot	2088	12491	24.8	60.4	15.1	14.5	71.3	.50	30.0	64	2.3	1.0	939	888	939	147	74
2744 x 2809	3282	12644	26.9	59.4	16.0	15.3	73.8	.57	29.1	69	2.8	1.0	936	888	936	150	83
Redman		12638	27.8	58.5	15.5	15.2	74.9	.57	32.2	67	2.3	1.5	908	884	934	151	80
Hope x Timstein	II-39-46	12488	28.5	59.5	16.2	15.6	73.6	.60	30.9	70	2.5	1.0	932	893	932	152	84
1691 x 1756	2105	12541	26.8	59.8	15.1	14.4	74.6	.53	32.3	66	2.0	1.0	928	890	928	151	87
Pilot x Mida	1953	12445	28.7	62.0	15.0	14.5	74.8	.54	29.8	66	2.3	1.0	926	875	926	151	82
Thatcher		10003	27.9	59.1	15.6	15.1	74.1	.56	28.8	67	2.5	1.0	920	886	920	149	81
Marquis		3641	23.8	59.1	14.7	14.3	73.1	.61	30.1	64	2.3	1.5	912	882	915	150	73
Hope x Timstein	II-39-47	12545	29.4	59.6	15.7	15.3	72.9	.60	30.0	70	2.5	0.5	906	852	912	153	81
2744 x 2809	3274	12643	29.7	59.3	15.7	15.1	75.2	.59	31.2	67	2.3	1.0	912	876	912	151	83
Thatcher x Surpresa	II-39-8	12641	29.5	61.6	15.5	15.1	74.7	.53	32.3	65	1.5	1.5	901	887	908	151	71
2744 x 2809	3284	12645	29.5	59.5	15.9	15.2	73.1	.62	25.9	72	3.3	0.5	902	866	908	152	82
Thatcher x W38-Hope	Wisc. 246	12649	29.9	59.0	15.2	14.7	73.4	.51	30.0	66	2.0	1.0	904	848	904	152	83
1552 x Mida	2083	12543	30.1	60.6	15.0	14.5	74.9	.62	30.4	68	2.0	1.5	877	868	900	153	72
Thatcher x Apex	2176	12639	27.0	60.2	15.1	14.7	74.5	.64	28.2	67	2.3	0.5	888	849	892	151	75
2744 x 2809	3285	12646	27.9	59.2	15.8	15.1	73.7	.63	27.2	73	2.8	1.0	885	820	885	154	83
2744 x 2809	3269	12642	26.7	59.2	15.8	15.3	74.6	.61	30.4	68	2.0	2.0	873	870	885	151	83
H.R.R. x Mercury	SD 1691	12499	25.0	59.0	15.9	15.1	71.6	.60	29.7	69	2.3	1.0	841	812	841	151	75
Hope x Timstein	II-39-51	12546	29.1	60.3	15.6	15.3	74.0	.63	27.9	69	2.0	1.5	795	789	804	153	75
Thatcher x Triunfo	SD 343	12497	28.7	61.5	15.8	15.1	72.4	.68	34.5	61	1.3	2.0	700	724	773	151	73
Average			27.7	59.8	15.6	15.0	73.7	.59	29.4	68	2.4	1.1	904	871	912	151	86
Range			6.3	3.5	1.6	1.6	3.9	.18	11.9	12	2.0	1.5	282	211	209	8	17



Table 6 - Yield, milling, baking and chemical results on hard red spring wheats grown in Intrastate Nurseries composited from stations indicated, 1943 crop.

North Dakota Intrastate Nursery 1/

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion	Mixing Time	Opti- mum Bro- mate	Methods & Volume			Average		
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best	Opti- mum	Wgt. of Loaf	Crumb Color	Grain Texture
Bu. Lbs. Pct. Pct. Pct. Pct. Min. Mg. Cc Cc Cc Grams Score Score																		
Pilot <sup>2</sup> x Thatcher	2030	12736	33.1	60.1	15.1	14.4	72.4	.50	28.6	69	2.0	1	971	909	971	155	78	92
1740 x Mida	2282		31.2	61.7	15.7	15.0	74.9	.51	28.6	69	2.5	1	954	889	954	151	93	88
Merit x Pilot	2012	12493	34.7	80.6	15.4	14.6	73.7	.57	26.3	70	3.0	1	948	874	948	153	82	87
1750 x 1753	2095	12551	32.3	62.4	16.0	15.2	73.5	.54	29.3	70	2.5	1	945	885	945	151	88	90
1552 x Mida	2150		34.4	61.4	15.0	14.5	75.2	.56	34.0	68	2.0	1	942	889	942	151	83	87
Pilot <sup>2</sup> x Merit	2164	12735	38.0	61.2	14.4	13.6	73.2	.58	23.2	70	3.0	1	942	860	942	154	77	88
Thatcher		10003	33.7	80.8	15.8	15.1	74.8	.53	32.5	67	2.5	1	931	844	931	151	72	87
Pilot x 1514	1931		35.3	61.6	14.9	14.2	74.2	.54	29.5	69	2.5	1	931	867	931	152	73	87
Pilot x Mida	1785	12647	33.0	61.2	15.3	14.7	76.4	.55	32.4	68	2.0	1	925	873	925	152	83	88
45.11.1	3647		27.7	59.6	16.3	15.3	71.5	.53	31.9	69	2.5	1	919	832	919	154	83	88
2744 x 2807	3301		36.6	60.8	16.0	15.4	72.6	.56	27.1	71	3.0	1	919	829	919	157	82	88
1568 x Merit	2120		33.7	61.2	14.8	14.2	74.9	.44	29.9	69	3.0	1	914	876	914	152	78	88
2744 x 2807	3284		33.2	60.8	16.2	15.4	73.3	.48	27.5	70	3.0	1	908	850	908	152	85	92
45.2.6	3612		29.6	59.8	16.9	16.0	73.8	.57	31.5	69	2.5	1	905	830	905	154	72	83
1691 x 1756	2035		37.2	61.8	14.8	14.1	74.5	.58	30.8	68	2.5	1	902	840	902	154	85	90
1556 x Mida	2223		38.8	61.1	15.2	14.6	72.8	.56	34.2	68	2.0	1	900	856	900	151	83	83
1568 x Merit	2130		36.0	62.7	14.9	14.1	74.8	.53	26.6	71	3.0	1	899	831	899	154	73	85
45.3.5	3618		29.8	59.4	16.0	15.4	74.3	.53	29.8	69	2.5	1	894	829	894	153	73	85
2744 x 2807	3210		41.7	61.5	15.2	14.4	75.5	.54	27.4	63	3.0	1	889	823	889	151	78	87
Hope x Timstein	M. 2776	12448	29.0	61.1	16.1	15.4	73.8	.57	32.1	69	2.5	1	877	830	877	155	78	88
45.9.13	3629		30.6	59.2	15.3	14.5	74.6	.53	30.3	67	2.5	1	877	828	877	150	72	88
Pilot x 1315	2061		31.7	60.5	14.8	14.1	73.3	.48	32.1	68	2.5	1	874	823	874	151	75	85
1552 x Mida	1924.110		37.2	61.7	13.7	13.1	75.4	.59	33.3	67	2.0	1	874	844	874	150	63	82
45.5.7	3621		30.4	60.0	16.0	15.4	72.7	.57	30.7	68	2.0	1	851	808	851	153	82	87
45.9.7	3626		34.6	59.1	15.1	14.3	74.4	.57	30.4	66	2.0	1	839	771	839	153	72	75
1556 x Mida	2283		30.4	61.8	14.6	14.0	74.0	.58	32.0	67	2.0	1	800	765	800	153	75	80
Average			33.6	60.9	15.4	14.7	74.0	.54	30.0	69	2.5	1.0	905	844	909	153	78	86
Range			14.0	3.6	3.2	2.9	4.9	.15	12.0	5	1.0	0.0	171	144	171	7	30	17

1/ Fargo, Langdon, Mandan and Dickinson

Table 6 - Continued

Montana Intrastate Nursery 1/

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearling Index Value	Absorption	Mixing Time	Optimum	Methods & Volume		Wgt. of Loaf	Average		
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best		Cc	Cc	
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Grams	Score	Score	
1764 x 1753	2213	12738	38.8	57.6	14.7	14.5	73.7	.59	23.6	71	3.0	1	977	949	977	150	70	85
Pilot 2 x Thatcher	2170		39.4	59.3	15.5	14.9	73.3	.47	25.9	69	2.5	0	939	940	974	150	75	82
1764 x Henry	2211	12733	36.6	57.5	14.7	14.8	72.4	.53	25.2	72	2.5	1	945	909	945	154	75	88
Thatcher	Check	10003	38.4	58.7	15.3	15.0	73.4	.51	26.7	67	2.5	1	922	851	922	152	77	87
1585 x Cadet	2166		40.5	60.5	14.4	14.6	72.5	.57	27.2	69	2.5	2	880	878	913	152	75	83
1585 x Cadet	2118		40.7	59.1	15.0	14.6	73.1	.52	27.5	67	2.5	1	905	873	905	152	73	90
Pilot x Merit	1993		39.9	58.0	14.5	13.9	72.8	.49	24.2	70	2.5	0	865	859	886	154	85	87
Pilot x Merit	1996		36.7	58.0	14.1	14.0	72.4	.54	24.8	69	2.5	1	886	873	886	152	78	87
Pilot x Mida	1964		39.5	58.4	14.5	13.9	74.1	.45	26.8	66	2.0	0	874	857	876	151	72	85
1764 x 1750	2209		39.3	60.2	14.4	14.2	74.4	.55	21.1	71	3.0	1	876	837	876	153	82	88
1764 x 1750	2097		36.9	60.0	14.8	14.7	74.5	.59	21.7	72	3.0	1	865	818	865	156	78	85
1615 x Pilot	2177		40.3	57.7	14.5	13.7	72.5	.49	24.5	68	2.5	0	853	846	865	152	75	87
Regent x 1582	1912	12446	38.3	58.9	14.7	14.5	76.7	.52	27.5	66	2.0	1	865	858	865	151	78	88
1567 x Pilot	2201		35.9	58.0	14.6	14.2	72.4	.55	26.3	67	2.0	0	830	809	842	152	77	83
Pilot x 1315	2064		39.5	58.5	13.9	13.8	73.2	.55	26.5	71	3.0	1	816	786	816	154	73	85
1760 x Pilot	2220		37.2	60.9	13.8	13.4	72.9	.51	25.3	71	2.5	1	815	786	815	155	75	82
Pilot x 1315	2061		38.9	58.0	13.8	13.5	74.2	.55	26.1	70	3.0	1	812	771	812	156	70	87
1764 x 1756	2169		37.5	59.4	14.5	14.0	73.5	.61	23.2	73	3.0	1	798	758	798	156	70	78
1691 x 1756	2251		38.3	59.6	13.7	13.4	73.6	.51	27.0	67	2.0	1	787	767	787	152	72	83
1449 x Pilot	2165		40.8	58.6	14.5	13.9	72.5	.58	22.3	72	2.5	1	763	742	763	156	68	78
1750 x 1753	2092		39.8	59.8	14.3	13.8	71.8	.50	26.4	67	2.5	1	758	720	758	152	70	78
Regent x 1315	1950		44.2	57.6	12.9	12.3	73.6	.50	24.6	69	2.5	0	726	722	729	155	72	82
Average			39.0	58.8	14.4	14.1	73.3	.53	25.2	69	2.6	0.8	853	828	858	153	75	84
Range			8.3	3.4	2.6	2.7	4.9	.16	6.4	7	1.0	2.0	251	229	248	6	17	12

1/ Moccasin



Table 7 - Yield, milling, baking, and chemical results on hard red spring wheats grown at six stations in 1948.

## Dickinson, North Dakota (Station Nursery)

Variety or Cross	State or N. No.	C. I. No.	Acre Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion Pct.	Mixing Time Min.	Opti- mum Bro- mate	Methods & Volume			Average			
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3	Best	Opti- mum	Wgt. of Leaf	Crumb Color	Grain Texture
Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Mg.	Cc	Cc	Cc	Grams	Score	Score				
1556 x Pilot	2307		40.5	60.4	15.7	14.9	74.1	.40	39.9	66	3.0	2	919	901	937	150	83	87	
Regent x Mida	1844.94		36.7	62.7	15.8	15.0	74.2	.48	31.9	68	3.0	1	925	895	925	152	88	88	
1552 x Mida	2023		39.5	62.9	15.3	14.3	75.9	.41	36.0	66	2.5	1	922	863	922	150	80	88	
Pilot x Premier	2154		38.1	62.6	16.1	15.4	76.8	.40	37.2	65	2.0	1	922	857	922	152	85	88	
1552 x Mida	1924.44	12746	36.1	62.0	15.6	14.6	77.0	.43	39.0	67	2.5	1	914	885	914	151	82	90	
Reg-Mida x 1552-Mida	2308		39.1	62.1	15.6	14.8	75.4	.39	38.6	64	2.0	1	914	861	914	151	82	87	
1552 x Mida	2084		38.6	62.4	14.9	14.1	75.4	.37	36.2	66	2.0	2	870	882	905	152	80	92	
1552 x Mida	2153		38.5	63.1	15.0	14.4	75.4	.40	35.5	65	2.0	2	865	876	901	154	82	90	
Pilot x Premier	2157		39.5	61.7	15.2	14.5	75.5	.39	34.6	66	2.5	1	900	883	900	150	85	90	
Mida		12008	35.6	62.6	15.8	15.0	76.0	.43	36.7	66	2.0	1	886	850	886	150	90	90	
1740 x Mida	2306		36.7	62.2	16.4	15.5	74.9	.40	35.3	65	2.0	1	868	819	868	150	87	88	
Ceres-Ko-Hussar x Merc.	1882		42.4	62.1	14.9	14.0	77.9	.45	29.5	69	3.0	1	865	826	865	151	78	88	
1556 x Mida	2310		39.4	61.8	15.4	14.2	73.1	.45	35.9	65	2.0	2	848	823	851	151	88	87	
Reg-Mida x 1552-Mida	2309		43.5	62.5	14.0	13.2	76.6	.38	37.0	64	2.0	1	833	768	833	150	83	83	
Regent x Mida	1844.15		44.9	60.4	13.9	13.0	75.6	.40	38.2	65	2.5	1	818	767	818	152	77	85	
Pilot x Premier	2154		38.1	62.7	14.3	13.2	75.8	.38	33.5	65	2.5	1	812	777	812	150	82	87	
Average			39.2	62.1	15.2	14.4	75.6	.41	35.9	66	2.3	1.3	880	847	886	151	83	88	
Range			9.3	2.7	2.5	2.5	4.8	.11	10.4	5	1.0	1.0	113	134	125	4	13	9	

Table 7 - Continued

## Langdon, North Dakota (Station Nursery)

Variety or Cross	State or N. No.	C. I. No.	Acres Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion	Mixing Time	Opti- mum Bro- mate	Methods & Volume			Average			
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Test	Cc	Cc	Wgt. of Leaf	Crumb Color	Grain Tex- ture
Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Grams	Score	Score						
1764 x Henry	2250		30.4	60.6	15.6	15.4	74.6	.49	26.8	69	2.5	2	868	903	942	153	75	88	
Pilot2 x Comet	1915		26.9	61.6	15.3	14.5	72.0	.49	31.5	67	2.5	1	940	907	940	150	90	93	
Pilot x 1514	2014-51		27.1	62.1	15.3	14.6	72.9	.48	29.6	69	2.5	1	936	898	936	150	85	93	
1764 x Henry	2211	12733	31.3	61.3	15.6	15.0	71.5	.46	29.7	70	3.0	2	883	914	931	153	75	87	
1764 x Henry	2249		30.1	60.4	14.3	13.8	73.2	.46	28.3	68	2.5	2	853	876	931	152	75	88	
1764 x Henry	2210		31.4	60.8	14.7	14.3	75.2	.55	25.8	71	3.0	2	874	885	922	154	72	88	
Thatcher	Check	10003	29.6	61.5	14.6	14.2	74.1	.47	30.8	70	2.5	1	916	863	916	152	80	88	
Pilot2 x Merit	2174	12732	33.1	61.0	14.6	13.7	74.8	.50	23.6	67	2.0	1	908	878	908	151	78	82	
Regent x 1315	2018		26.9	61.9	15.7	14.8	72.6	.46	25.5	66	2.0	1	905	872	905	152	77	90	
1750 x 1753	2092	12549	28.5	61.7	15.5	14.5	72.0	.52	31.7	66	2.0	1	901	873	901	151	87	88	
1764 x Henry	2270		31.2	60.3	14.2	13.7	72.1	.50	28.0	69	3.0	2	879	879	900	152	77	87	
1568 x Merit	2011		32.5	62.7	14.3	13.6	76.3	.46	28.3	68	2.5	1	896	862	896	152	75	88	
Mida	Check	12008	26.6	62.0	15.6	14.8	73.8	.49	31.2	67	2.0	1	882	854	882	153	93	95	
1760 x 1790	2248		27.1	62.8	14.9	14.6	73.0	.52	29.9	68	2.0	1	879	836	879	152	73	88	
1750 x 1752	2218		31.0	62.4	14.8	14.3	74.2	.50	31.6	68	2.0	1	862	843	862	153	87	92	
1691 x 1756	2035-1		28.7	61.9	14.6	13.9	74.3	.48	29.3	70	2.5	1	842	793	842	155	82	88	
Mida x 1529	2214		34.3	62.5	13.5	12.8	72.8	.44	31.4	68	2.5	1	830	806	830	154	83	90	
1750 x 1752	2212		29.9	62.8	14.4	13.7	73.6	.46	29.7	69	3.0	1	824	809	824	153	87	90	
Average			29.8	61.7	14.9	14.2	73.5	.49	29.1	68	2.4	1.3	882	870	897	152	81	89	
Range			7.7	2.5	2.2	2.2	4.8	.11	8.2	5	1.0	1.0	116	121	118	5	21	13	



Table 7 - Continued

## Madison, Wisconsin (Station Nursery)

Variety or Cross	State or N. No.	C. I. No.	Acre Yield	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion	Mixing Time	Opti- mum Bro- mate	Methods & Volume			Average		
					Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best	Opti- mum	Wgt. of Loaf	Crumb Color	Grain Tex- ture
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Cc	Grams	Score	Score	
H 195-59	Check	10003	38.2	59.1	14.2	13.7	73.0	.53	39.2	63	2.0	0	859	858	925	149	87	90
Thatcher			35.0	58.7	13.9	13.2	74.0	.55	34.2	65	2.5	0	865	841	891	148	82	88
H 195-59-8			38.7	59.4	14.3	13.5	74.0	.50	38.7	63	2.5	0	809	820	889	148	87	90
H 194-41-10			42.0	58.1	13.5	12.7	74.1	.48	35.9	62	2.0	0	853	826	870	148	87	88
H 194-3-1			37.0	57.6	14.4	13.6	72.1	.49	37.9	64	2.5	1	869	818	869	147	93	93
H 194-28			38.9	57.3	13.9	13.1	73.1	.51	40.4	64	2.5	1	865	826	865	148	88	95
H 194-79			43.5	57.4	14.5	13.8	74.3	.53	36.2	62	2.0	1	862	815	862	148	83	90
H 194-41			40.9	58.4	13.3	12.5	75.1	.49	36.3	62	2.0	1	845	812	845	148	90	90
Henry			12265	41.8	13.1	12.2	76.6	.53	47.3	62	2.0	1	839	810	839	149	82	88
H 195-13-7				35.9	57.2	13.8	12.9	74.1	.58	39.1	63	2.0	1	792	753	792	149	78
Average			39.2	58.3	13.9	13.1	74.0	.52	38.5	63	2.2	0.6	846	818	865	148	86	90
Range			8.5	2.2	1.4	1.6	4.5	.10	13.1	3	0.5	1.0	77	105	133	2	15	12

## Brookings, South Dakota (Station Nursery)

Pilot x Merit	2012	12493	29.2	58.2	14.8	13.9	70.8	.55	24.3	67	2.5	1	965	917	965	148	92	90	
1520 x 1753	2247		31.5	59.3	14.5	13.9	74.6	.46	33.4	63	2.0	1	956	904	956	145	83	85	
H.R.P. x Clarendon	SD 2202		26.8	58.1	16.0	15.3	76.2	.50	31.4	62	1.5	1	937	851	937	147	80	85	
H.R.P. x Clarendon	SD 2149		20.5	58.6	16.1	15.3	73.2	.54	39.1	62	1.5	1	922	891	922	147	87	87	
1764 x 1753	2213	12738	27.1	57.4	14.7	14.0	72.0	.57	26.3	64	2.0	1	916	869	916	147	83	88	
Triunfo x Mercury	SD 137		22.0	58.0	16.1	15.0	71.8	.56	37.1	62	1.5	1	914	889	914	149	83	85	
Regent x 1582	1912	12446	24.4	57.2	15.5	14.6	70.4	.57	29.0	63	1.5	1	902	874	902	149	82	85	
1568 x Merit	2130		27.2	59.5	14.4	13.7	71.2	.55	26.0	68	2.5	1	873	859	873	150	87	88	
1750 x 1753	2244		28.4	59.3	14.3	13.7	73.4	.51	29.7	64	2.0	0	865	834	868	148	87	85	
Thatcher x Triunfo	SD 152		21.5	57.8	16.4	15.5	71.8	.54	28.9	62	1.0	2	784	826	865	150	80	88	
Pilot	Check	11945	24.1	60.3	15.1	14.2	72.2	.57	28.5	64	2.0	1	859	820	859	148	88	85	
1764 x Henry	2211	12733	29.4	57.4	14.7	13.8	72.2	.49	26.7	65	2.5	1	842	831	842	150	78	87	
H.R.F. <sup>2</sup> x Clarendon	SD 2149		20.5	56.5	16.0	15.4	71.9	.60	30.5	65	1.5	1	836	825	836	152	68	73	
Thatcher x Triunfo	SD 139		28.4	58.9	15.8	15.1	72.8	.61	29.3	60	1.0	3	683	747	781	146	73	80	
Triunfo x Mercury	SD 1199		23.1	57.0	15.0	14.5	73.3	.74	25.5	62	1.5	0	564	561	570	154	50	53	
Average			25.6	58.1	15.3	14.5	72.5	.56	29.7	64	1.8	1.1	855	833	867	149	80	83	
Range			11.0	3.8	2.1	1.8	5.8	.28	14.8	8	1.5	3.0	401	356	395	9	42	37	

Table 7 - Continued

Mandan, North Dakota (Station Nursery)

Variety or Cross	State or N. No.	C. I. Acre Yield No.	Test Wgt.	Protein		Flour		Pearl- Index Value	Absorp- tion	Mixing Time	Opti- mum Bro- mate	Methods & Volume			Wgt. of Loaf	Average		
				Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best	Opti- mum		Cc	Cc	Grams
			Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Cc	Grams <td>Score<td>Score</td></td>	Score <td>Score</td>	Score	
Regent x Pilot	2245		34.3	59.4	16.4	16.0	73.6	.54	31.0	65	2.5	2	1087	1046	1095	149	83	78
Pilot <sup>2</sup> x Thatcher	2170		23.3	59.0	16.3	15.7	73.0	.50	26.0	64	2.0	1	1082	1071	1082	147	78	83
Pilot <sup>2</sup> x Regent	2175		31.5	60.2	16.4	15.7	72.5	.47	28.2	64	3.0	1	1080	1032	1080	148	82	82
1520 x 1750	2247		20.2	59.7	16.2	15.6	73.0	.42	32.9	65	3.0	2	1052	1002	1079	149	85	80
Thatcher	Check	10003	28.2	59.2	16.1	15.8	72.0	.47	30.3	67	2.5	1	1079	1016	1079	149	83	80
Pilot <sup>2</sup> x Merit	2174		26.9	58.6	16.5	15.9	72.5	.52	21.8	67	3.0	1	1072	1020	1072	150	82	83
Pilot x 1514-64	2014.64		32.2	60.5	15.8	15.1	74.3	.50	27.2	68	2.5	2	983	970	1015	151	75	80
1764 x 1750	2209		32.9	60.8	16.0	15.0	72.8	.56	20.9	68	2.5	1	1009	970	1009	150	85	87
1520 x 1753	2192		31.5	59.3	16.7	16.1	73.3	.45	34.5	67	2.0	3	923	973	1007	151	87	82
1691 x 1756	2176		32.4	61.4	15.9	15.3	73.5	.37	32.7	64	2.5	1	1007	948	1007	149	88	90
1691 x 1756	2190		23.9	61.4	15.8	15.0	71.3	.43	37.2	66	2.5	2	959	932	998	150	92	78
1750 x 1753	2185		31.2	61.2	16.0	15.3	74.3	.54	29.2	66	2.0	1	995	947	995	150	90	88
Pilot x 1315	2064		32.0	60.4	16.3	15.7	73.8	.44	34.6	66	2.5	2	980	929	980	151	80	85
1750 x 1753	2244		35.7	61.1	15.6	15.1	73.8	.50	27.1	65	2.5	1	977	926	977	149	87	87
1615 x Pilot	1902		32.5	60.8	15.6	14.8	72.4	.51	20.3	65	2.5	1	948	934	948	148	85	90
1764 x 1750	2246		43.8	60.9	15.6	15.0	72.9	.62	24.3	67	2.0	1	862	849	862	153	85	88
Average			30.8	60.2	16.1	15.4	73.1	.49	28.6	66	2.5	1.4	1006	973	1018	150	84	84
Range			23.6	2.8	1.1	1.3	3.0	.25	16.9	4	1.0	2.0	225	222	233	6	17	12

Moccasin, Montana (Station Nursery)

Comet x Pilot <sup>2</sup>	1915		35.3	61.0	14.6	14.5	73.7	.49	28.1	68	2.0	1	919	893	919	154	78	83
1520 x 1753	2362		35.7	61.8	14.5	13.9	73.5	.49	25.4	68	2.5	1	903	865	903	155	78	88
Pilot x 1514	1931		37.4	60.5	14.6	14.3	73.6	.50	27.3	68	2.5	0	859	872	894	151	72	83
Thatcher	Check	10003	38.5	60.1	13.9	13.6	74.1	.53	25.6	69	3.0	1	891	845	891	155	77	90
Pilot <sup>2</sup> x Merit	2266		34.9	60.1	14.2	13.7	73.2	.50	20.5	71	3.0	0	868	845	876	158	78	92
Pilot <sup>2</sup> x Merit	1416A-1-6-3-2		33.2	59.6	14.2	13.6	72.7	.52	20.5	73	3.5	1	862	836	862	159	78	88
1691 x 1756	2190		33.5	60.5	13.1	12.6	75.7	.51	28.0	68	2.5	1	848	831	848	155	85	93
Pilot <sup>2</sup> x Thatcher	2178		36.9	59.4	13.3	12.8	71.4	.44	25.4	69	2.5	0	778	793	836	157	83	88
Mida-1315 x 1520	Bo 41A-1-10-2-3		34.3	61.6	14.4	14.5	75.7	.44	32.6	66	2.0	1	833	802	833	155	80	87
1248 x Merit	2185		37.1	60.5	13.8	13.6	75.1	.52	22.9	70	3.0	1	830	797	830	155	88	90
1520 x 1753	2102		33.6	61.8	14.5	13.8	72.9	.53	24.9	68	3.0	0	781	775	827	153	80	87
1568 x Merit	1390A-1-4-3-2		35.4	60.0	14.0	13.7	74.1	.48	24.2	73	3.5	1	806	780	806	160	82	88
Ren.-1315 x 1441-Ren.	1414A-1-14-1-3		34.5	60.6	13.7	13.3	74.7	.48	24.9	69	2.5	1	806	793	806	156	72	90
1750 x 1753	2039		34.3	62.0	13.8	13.4	72.3	.51	26.6	71	2.5	0	795	778	798	159	85	87
1750 x 1753	1448A-1-37-2-2-1		32.6	61.2	13.6	13.2	73.7	.50	25.3	70	2.5	0	783	766	787	157	83	88
1750 x 1753	1448A-1-19-1-3		31.5	61.4	13.9	13.6	72.4	.52	25.4	67	3.0	1	775	750	775	154	78	82
Average			34.9	60.8	14.0	13.6	73.7	.50	25.5	69	2.7	0.6	834	814	843	156	80	88
Range			7.0	2.6	1.5	1.9	4.3	.09	12.1	7	1.5	1.0	144	143	144	9	16	11



### UNIFORM VARIETIES BAKED BY SEVEN METHODS

The composite flours of the seven uniform plot varieties (table 2) for the Eastern and Western sections were baked all together by seven methods. These included the regular bread-baking methods and malt-phosphate-bromate bake with three different fermentation times and the basic procedure which includes bromate but no shortening and nonfat dry milk solids. The malt-phosphate-bromate bake is used by Canadian and North Dakota laboratories. The baking results are given in table 6 and other results in table 2.

The basic baking procedure produced the smallest loaf volume and the regular methods with 1 milligram of bromate the largest loaf volumes of the seven methods used. The only exception to this was for Mida x Cadet, N. 1831, in both the Eastern and Western sections and Rival in the Eastern section where the loaf volumes were largest for the bake with 2 milligrams of bromate and for Pilot in the Western section for the 2-hour malt-phosphate-bromate method. The largest loaves, by the malt-phosphate-bromate baking method, were generally produced by the 2.0 hour fermentation time. The 2.0 hour fermentation malt-phosphate-bromate bake and the 1 milligram of bromate regular method produced loaves that were nearly the same in volume. The varieties showing a high degree of tolerance to length of fermentation time were Rival and Mida (Eastern section) and Cadet and Hope x Timstein, M. 2776, from the Western section. Those varieties averaging best in loaf volume by the average of all methods were Mida x Cadet, M. 1831, Hope x Timstein, M. 2776, and Cadet in the Eastern section and Pilot, Thatcher, and Cadet in the Western section. The average for both sections shows Cadet, Hope x Timstein, M. 2776, and Thatcher had the highest volumes for all methods. The average of all methods also show the varieties from the Western section to be highest in loaf volume.

### COMMERCIAL SAMPLES

As in past years a number of commercially grown wheat samples were obtained through the Grain Branch, Production and Marketing Administration for comparison with the varieties and strains produced in experimental plots. Fifteen such samples, representing a number of grades and types were obtained at Denver, Colorado; Great Falls, Montana; and Minneapolis and Duluth, Minnesota. The samples were composited by grade from 2,090 cars of wheat grading No. 3 or better and represent the better grades of hard red spring wheats received at these markets. This is the tenth season such samples have been tested. The results are given in table 9.

These samples generally averaged lower in protein content than the experimental plots and nursery samples. Otherwise, the milling, baking and chemical results do not appear to be greatly different, especially when compared with samples having approximately the same protein content and test weight.

Table 8 - Uniform Varieties, 1948, composited from Eastern and Western Sections and baked by seven methods.

Section and Variety	State or N. No.	Regular Methods Mil. Bromate			Malt-Phosphate-Bromate Fermentation Time (hrs)			Basic	Average 7 Methods
		0	1	2	1.5	2.0	2.5		
<u>Eastern Section</u>									
Mida x Cadet	1831	905	917	920	853	900	836	778	873
Hope x Timstein	2776	881	943	901	842	888	818	749	860
Cadet		833	950	865	851	916	836	755	858
Thatcher		847	876	859	870	900	836	720	844
Mida		901	911	833	854	853	795	726	839
Rival		848	868	888	824	882	842	695	835
<hr/>									
Average		869	911	878	849	890	827	737	852
<hr/>									
<u>Western Section</u>									
Pilot		965	992	917	951	1000	934	894	951
Thatcher		934	956	883	913	998	928	798	916
Cadet		936	998	934	911	900	910	789	911
Hope x Timstein	2776	928	962	925	862	934	900	830	905
Mida x Cadet	1831	853	901	916	883	896	830	738	860
Mida		894	905	848	905	910	795	749	858
<hr/>									
Average		918	952	904	904	940	883	800	900
<hr/>									
<u>Average of Eastern and Western Composites</u>									
Cadet		885	974	900	881	908	873	772	885
Hope x Timstein	2776	905	953	913	852	911	859	790	883
Thatcher		871	916	871	892	949	882	759	880
Mida x Cadet	1831	879	909	918	868	898	833	758	867
Mida		898	908	841	880	882	795	738	849
<hr/>									
Average		888	932	889	875	910	848	763	873



Table 9 - Milling, baking and chemical results on fifteen composite commercial samples of hard red spring wheat obtained at Great Falls, Montana; Duluth, Minnesota; Denver, Colorado; and Minneapolis, Minnesota representing the 1948 crop.

Location Where Obtained	Carlot Receipts Composited	U. S. Grade	Test Wgt.	Protein		Flour		Pearl- ing Index Value	Absorp- tion	Mixing Time	Opti- mum Pro- mate	Method & Volume			Average		
				Wheat	Flour	Yield	Ash					No. 6	Avg. 3 Best	Opti- mum Cc	Wgt. of Loaf	Crumb Color	Grain Tex- ture
Duluth, Minnesota																	
Do	224	1 Hvy. D.N.S.	61.3	13.9	13.3	73.8	.48	32.2	68	2.5	1	853	825	953	152	77	87
Do	152	1 D.N.S.	59.6	13.8	13.3	73.9	.53	33.4	68	2.5	2	865	840	871	153	80	90
Do	130	1 N.S.	59.2	13.7	12.6	72.9	.46	37.0	64	2.5	2	800	801	818	152	85	87
Great Falls, Mont.																	
Do	606	1 Hvy. D.N.S.	62.2	12.7	12.3	74.6	.41	30.9	64	2.0	0	775	773	778	152	80	83
Do	110	1 D.N.S.	59.3	14.9	14.0	72.1	.41	29.1	66	2.5	1	886	858	886	151	78	92
Do	53	2 D.N.S.	61.5	12.8	12.2	73.0	.40	30.1	67	2.5	0	784	781	798	152	82	85
Do	30	1 Hvy. N.S.	62.4	11.4	10.8	72.6	.41	30.1	66	2.5	0	697	701	724	153	78	80
Minneapolis, Minn.																	
Do	112	1 Hvy. D.N.S.	61.4	14.0	13.2	72.8	.43	34.8	62	2.0	1	792	769	792	149	80	87
Do	86	1 D.N.S.	59.7	14.0	13.2	73.1	.45	35.1	62	2.0	1	801	783	801	148	83	88
Do	87	2 D.N.S.	59.3	14.0	13.2	71.7	.46	34.8	63	2.0	0	784	788	818	148	80	90
Do	93	1 Hvy. N.S.	61.3	12.6	12.0	73.7	.44	37.2	62	2.5	0	701	707	721	151	80	85
Do	131	1 N.S.	59.5	13.3	12.4	74.4	.46	36.6	63	2.5	0	752	748	760	149	82	87
Do	132	2 N.S.	59.0	13.3	12.3	73.9	.50	37.0	62	2.0	1	752	737	752	150	77	85
Do	133	3 N.S.	56.8	13.5	12.5	73.2	.53	39.4	60	2.5	0	709	718	741	146	78	85
Denver, Colorado																	
Do	11	1 Hvy. D.N.S.	62.1	12.5	11.9	70.7	.50	30.9	62	2.0	0	683	702	744	147	72	87
Average Range																	
			60.3	13.4	12.6	73.1	.46	33.9	64	2.3	0.6	775	769	790	150	79	87
			5.6	3.5	3.2	3.9	.13	10.3	8	0.5	2.0	203	157	165	7	13	12

## CORRELATION AND REGRESSIONS

Correlation coefficients ( $r$ ) for loaf volume and flour protein content of 9 varieties and strains have been calculated and are presented in table 10. Also shown in this table is the slope of the regression line or the change in loaf volume for each 1.0 percent of protein ( $b_1$ ), the average protein content of the flour and the loaf volume of the bread, and the loaf volumes adjusted to a 13.0 percent protein basis by the means of the regression equation. The plotted regression lines for each variety are shown in two graphs in figure 1.

The graphs show that the relation between loaf volume and protein content is generally linear. These results are in accordance with the last 4 years (1944 to 1948) where, with a few exceptions, the points fell on or very close to the calculated regression lines. Most of the correlation coefficients for loaf volume and flour protein content are high. The highest coefficients are for Mida x Cadet, N. 1831, and Pilot. The wheats having the lowest coefficient this season are Rival, Cadet, Hope x Timstein, M. 2776, and Thatcher. It should be noted that the number of samples of each variety is rather small for a study of this kind. This fact should be considered in evaluating the results.

One of the important results of this study and of interest are the differences in the level and particularly in the slope of the regression lines for the different varieties. The regression lines for the six varieties and three strains shown in the two graphs include the regression line for Thatcher repeated in each graph as a standard of comparison.

There was some variation in the slope and level of the regression lines among the varieties compared in graph A. The slope of the line for Pilot was steeper than the slope of the other lines compared in this group. The slope of the line for Cadet was about the same but higher than that of Mida. The change in loaf volume for each 1 percent of protein was highest for Pilot (50.1 cc.) and lowest for Rival (31.0 cc.). Pilot (863 cc.) and Rival (857 cc.) were higher in loaf volume, converted to a 13.0 percent protein basis, than Thatcher (850 cc.) while Cadet (841 cc.) and Mida (816 cc.) were lower in loaf volume than Thatcher.

The regression line for <sup>Pilot x</sup> Mida x Cadet, N. 1756, was lowest (graph B) with the other strains somewhat higher and generally grouped about the regression line for Thatcher. Hope x Timstein, M. 2776, had the smallest change (30.7 cc.) in loaf volume for each 1 percent of protein among the samples compared in both graphs. Mida x Cadet, N. 1831, was the highest of this group in loaf volume (862) converted to a 13.0 percent protein basis. Hope x Timstein, M. 2776, (848 cc.) was substantially like Thatcher which averaged 850 cc. (13.0 percent protein basis) in loaf volume.

The relative position of the regression lines appears to be a rather satisfactory measure of the relative protein quality of these varieties. From these lines the varieties and strains can be compared with each other

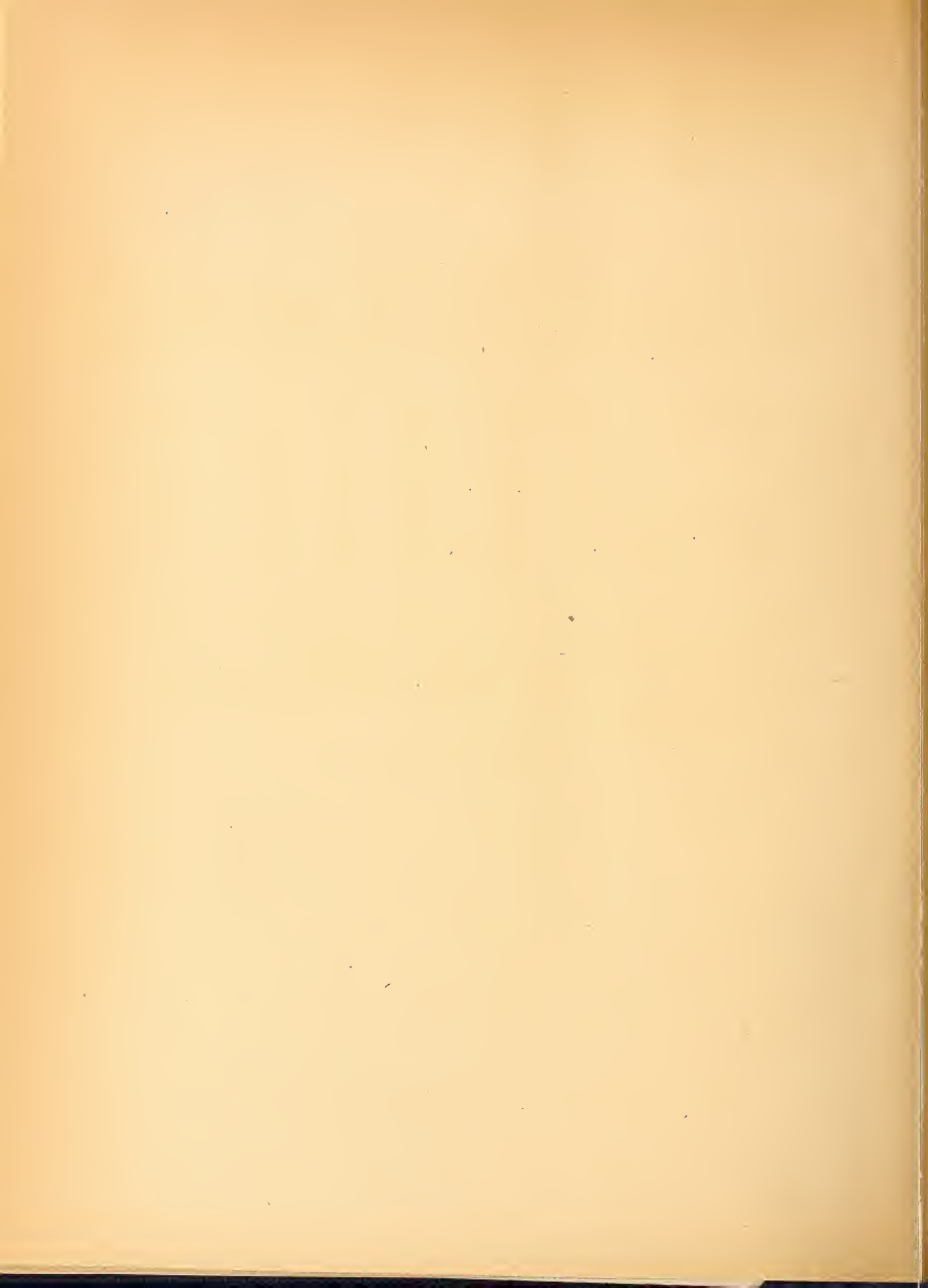


by the means of loaf volume taken at a medium protein level (13.0 percent) as calculated from the regression lines. The loaf volume for each variety is the point at which the regression line crosses the 13.0 percent protein value in the graphs. These loaf volumes arranged in descending order are shown in the last column of table 10.

Table 10 - Summary of protein content - loaf volume.

Variety or Cross	State or N. No.	No. of samples	b <sub>1</sub> <u>1/</u>	r <u>2/</u>	Protein of flour Percent	Average loaf volume cc.	Loaf volume at 13.0 pct. protein content <u>3/</u>
Pilot		20	50.1	.878	13.5	888	863
Mida x Cadet	1831	20	42.2	.893	13.2	870	862
Redman		12	35.6	.803	14.3	905	858
Rival		17	31.0	.704	13.8	881	857
Thatcher		31	36.8	.669	14.4	902	850
Hope x Timstein	2776	22	30.7	.750	14.8	899	848
Cadet		21	41.1	.732	14.1	887	841
Pilot x Mida	1756	18	40.9	.844	13.0	829	829
Mida		23	44.9	.858	14.1	866	816

- 1/ Slope of the regression line or the cubic centimeter change in loaf volume for each 1 percent of protein.
- 2/ Correlation coefficients for loaf volume and flour protein content. All correlation coefficients are significant at the 1 percent level.
- 3/ Calculated from regression equation.





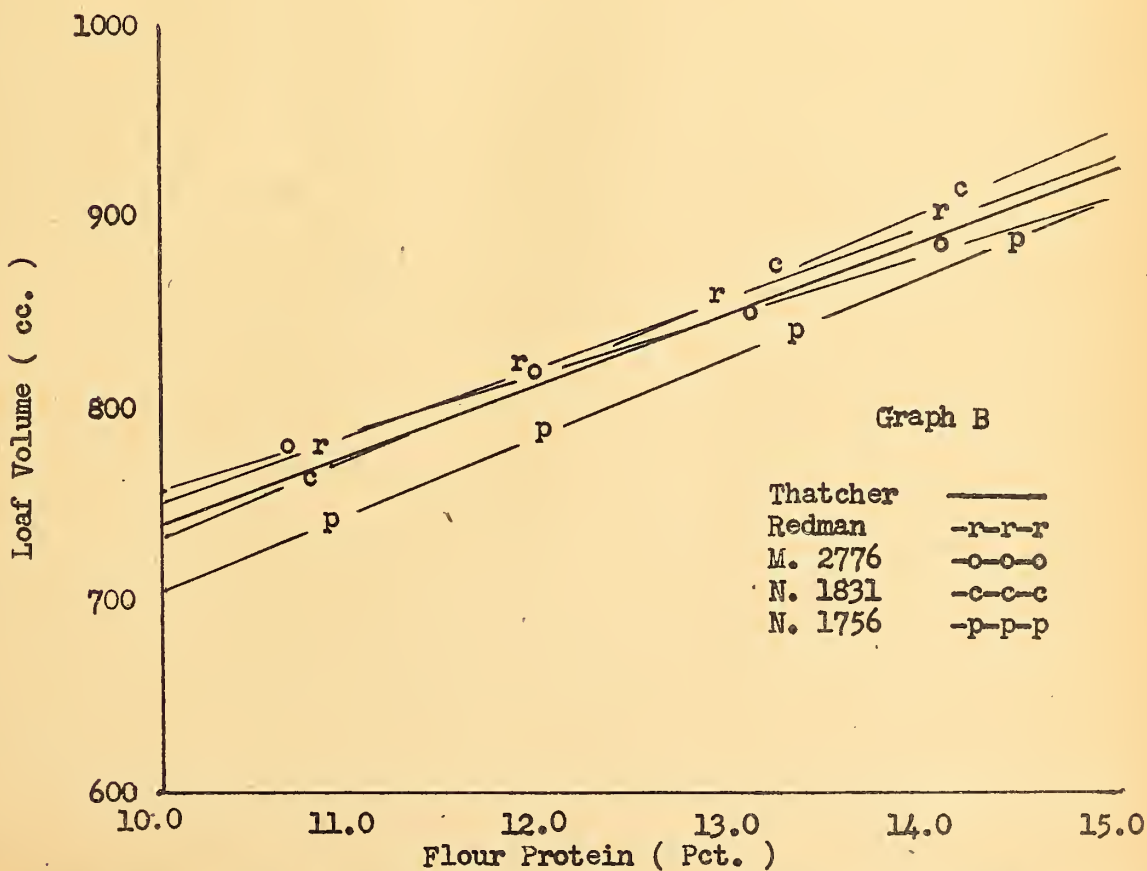
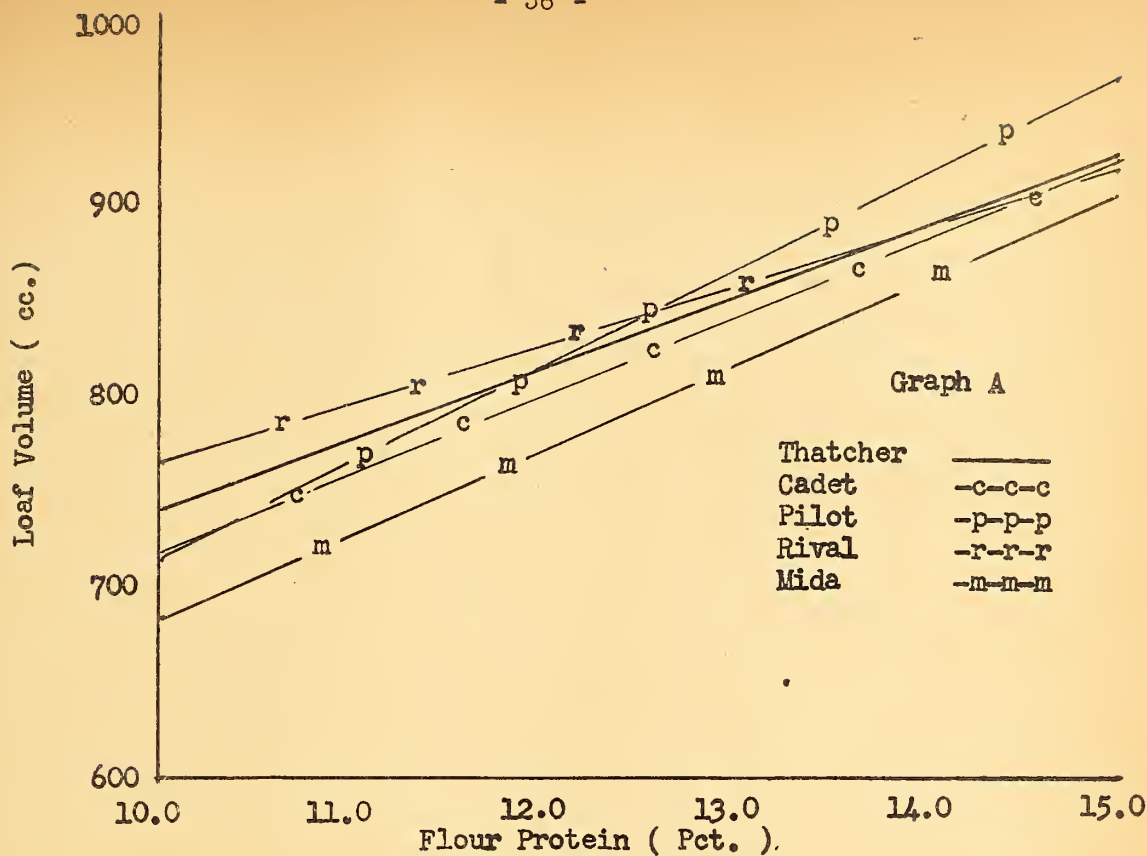


Figure 1. - Regression lines for flour protein and loaf volume for a number of hard red spring varieties and strains with Thatcher included for comparisons, 1948 crop.

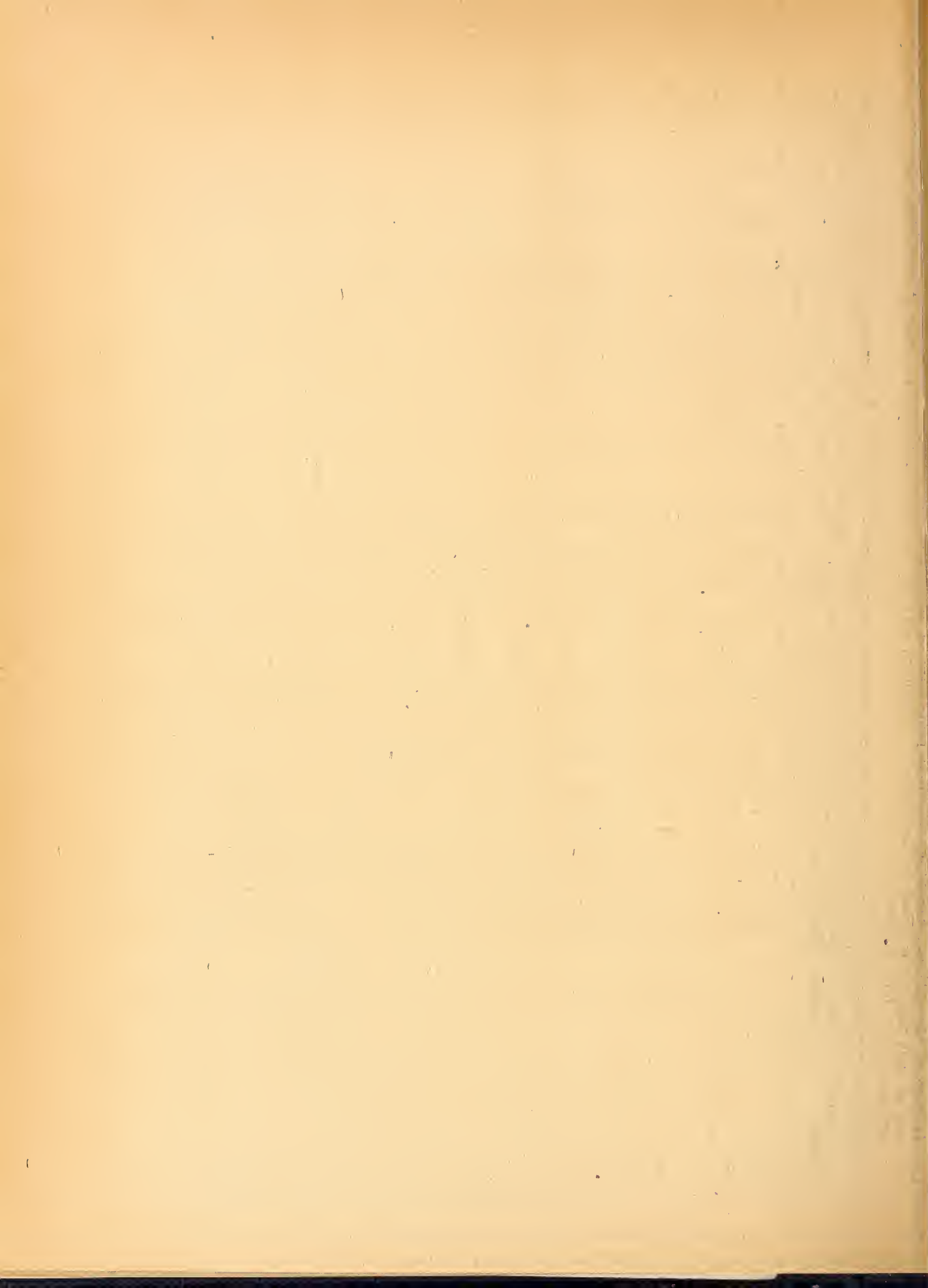




Table 11 - Average of the milling, baking and chemical properties of 13 wheats, the average of comparable samples of Thatcher, and of each variety as shown in percentage of Thatcher, with the varieties arranged in order of percentage for optimum loaf volume in 1948.

Variety or Cross	No. of Samples	Acre Yield	Test Weight	Protein		Flour		Pearling Index Value	Absorption	Mixing Time	Optimum Moisture	Methods & Volume			Average Crumb Color	Grain Texture
				Wheat		Ash						No. 6	Avg. 3 Best	Optimum		
				Pct.	Pct.	Yield	Pct.									
Bu.	Lbs.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Min.	Mg.	Cc	Cc	Cc	Cc	Score	Score	
Rescue Thatcher Percentage of Thatcher	4	29.1	61.3	14.7	14.4	73.9	.47	36.2	65	2.0	2	904	902	927	82	87
	4	34.4	60.5	14.8	14.3	73.3	.49	28.6	67	2.4	1.25	863	844	370	80	87
		84.6	101.3	99.3	100.7	100.8	95.9	126.6	97.0	83.3	160.0	104.8	106.9	106.6	102.5	100.0
Redman Thatcher Percentage of Thatcher	12	28.6	58.9	14.8	14.3	74.3	.50	34.8	67	2.5	1.67	880	872	905	84	87
	12	30.4	59.7	14.9	14.3	73.8	.52	30.2	66	2.4	1.42	882	856	887	78	87
		94.1	98.7	99.3	100.0	100.7	96.2	115.2	101.5	104.2	117.6	99.8	101.9	102.0	107.7	100.0
Minn. 2776 Thatcher Percentage of Thatcher	22	28.6	59.8	15.5	14.8	73.3	.53	33.0	68	2.6	1.23	881	869	899	86	89
	22	30.3	59.2	15.0	14.4	73.3	.51	30.6	66	2.4	1.32	878	855	393	76	87
		94.4	101.0	103.3	102.8	100.0	103.9	107.8	103.0	108.3	93.2	100.3	101.6	100.7	113.2	102.3
Pilot Thatcher Percentage of Thatcher	20	29.5	58.9	14.4	13.5	72.1	.50	29.4	65	2.2	.85	878	860	388	84	90
	20	30.2	59.1	15.0	14.4	73.2	.51	30.7	66	2.4	1.35	876	856	391	77	87
		97.7	99.7	96.0	93.8	98.5	98.0	95.8	98.5	91.7	63.0	100.2	100.5	99.7	109.1	103.4
Cadet Thatcher Percentage of Thatcher	21	28.0	58.3	14.7	14.1	72.5	.53	29.2	69	2.6	1.38	875	864	387	85	89
	21	30.2	59.1	15.0	14.4	73.2	.51	30.5	66	2.4	1.33	876	856	391	76	87
		92.7	98.6	98.0	97.9	99.0	103.9	95.7	104.5	108.3	103.8	99.9	100.9	99.6	111.8	102.3
Rushmore Thatcher Percentage of Thatcher	8	25.9	59.1	14.6	14.0	74.5	.52	36.1	66	2.8	1.38	848	839	855	79	90
	8	30.7	59.0	14.5	13.9	73.5	.51	31.2	66	2.4	1.00	838	844	359	77	88
		84.4	100.2	100.7	100.7	101.4	102.0	115.7	100.0	116.7	138.0	101.2	99.4	99.5	102.6	102.3
Rival Thatcher Percentage of Thatcher	17	28.2	59.2	14.6	13.8	75.0	.56	30.6	69	2.7	1.47	863	853	881	80	89
	17	30.2	59.4	14.8	14.2	73.5	.52	30.6	66	2.4	1.53	875	853	887	76	87
		93.4	99.7	98.6	97.2	102.0	107.7	100.0	104.5	112.5	96.1	98.6	100.0	99.3	105.3	102.3
Henry Thatcher Percentage of Thatcher	9	29.5	59.4	13.5	12.6	75.3	.50	39.2	64	2.3	1.78	844	842	866	75	87
	9	29.2	59.3	14.7	14.1	73.3	.53	30.5	66	2.4	1.33	863	835	877	76	87
		101.0	100.2	91.8	89.4	102.7	94.3	128.5	97.0	95.8	133.8	97.8	100.8	98.7	98.7	100.0
N. 1831 Thatcher Percentage of Thatcher	20	30.6	60.0	13.9	13.2	74.9	.53	31.5	67	2.4	1.35	857	846	870	81	88
	20	31.1	59.3	14.9	14.3	73.2	.51	30.5	66	2.4	1.30	873	852	888	76	87
		103.4	98.4	93.3	92.3	102.3	103.9	103.3	101.5	100.0	103.8	98.2	99.3	98.0	106.6	101.1
Mida Thatcher Percentage of Thatcher	23	27.4	60.7	14.9	14.1	74.4	.51	33.2	67	2.2	.91	858	839	856	88	90
	23	29.7	59.2	14.9	14.4	73.3	.52	30.7	66	2.4	1.30	878	856	891	76	87
		92.3	102.5	100.0	97.9	101.5	98.1	108.1	101.5	91.7	70.0	97.7	98.0	97.2	115.8	103.4
N. 1898 Thatcher Percentage of Thatcher	5	31.1	60.0	13.9	13.2	73.3	.55	25.5	70	3.0	.80	873	839	875	83	85
	5	30.5	59.9	15.1	14.5	74.3	.50	30.5	66	2.4	.60	887	865	900	78	87
		102.0	100.2	92.1	91.0	98.7	110.0	83.6	106.1	125.0	133.3	98.4	97.0	97.2	106.4	97.7
N. 1953 Thatcher Percentage of Thatcher	5	24.6	61.3	14.6	13.8	74.2	.52	31.0	66	2.3	1.00	873	836	873	84	88
	5	23.5	58.5	15.5	14.9	73.7	.53	30.8	66	2.3	1.20	896	880	913	79	87
		104.7	104.8	94.2	92.6	100.7	98.1	100.6	100.0	100.0	83.3	97.4	95.0	95.6	106.3	101.1
N. 1756 Thatcher Percentage of Thatcher	18	30.3	60.9	13.8	13.0	73.6	.48	33.1	64	2.2	.78	817	798	829	88	89
	18	29.5	59.0	15.0	14.4	73.0	.50	30.6	66	2.4	1.28	871	851	888	76	87
		102.7	103.2	92.0	90.3	100.8	96.0	108.2	97.0	91.7	60.9	93.8	93.8	93.4	115.8	102.3

Table 12 - Annual and total number of samples comparable with Thatcher and weighted average, milling, baking, and chemical properties expressed in percentage of Thatcher for the 11 years, 1938 through 1948.

Variety State or Nursery No.	Crop year and number of samples											
	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	Total
Thatcher	11	12	14	16	18	20	18	23	20	25	31	208
Pilot	8	11	14	13	14	14	16	19	20	19	20	168
Cadet	--	--	2	10	16	13	14	18	19	19	21	132
Mida	--	2	9	10	7	8	14	18	20	19	23	130
Rival	8	9	9	13	11	12	10	11	14	15	17	129
N. No. 1756	--	--	--	--	--	4	7	13	12	14	18	68
Henry	--	--	--	--	3	6	6	5	10	8	9	47
N. No. 1831	--	--	--	--	--	--	--	4	5	11	20	40
Minn. 2776	--	--	--	--	--	--	--	--	6	9	22	37
Redman	--	--	--	--	--	--	--	--	9	9	12	30
Rushmore	--	--	--	--	4	4	2	3	4	4	8	29
Rescue	--	--	--	--	--	--	--	5	7	6	4	22
N. No. 1898	--	--	--	--	--	--	--	--	2	4	5	11
N. No. 1953	--	--	--	--	--	--	--	--	1	1	5	7

Variety State or Nursery No.	Test weight per bushel											
	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	Wgt'd. Avg.
N. No. 1953	-	-	-	-	-	-	-	-	103.4	107.0	104.8	104.9
Mida	-	104.8	105.6	107.9	106.5	104.1	102.9	106.2	103.2	104.0	102.5	104.3
N. No. 1756	-	-	-	-	-	105.5	104.1	105.1	103.0	104.0	103.2	104.1
Rushmore	-	-	-	-	101.4	103.6	103.1	104.7	102.9	101.7	100.2	102.1
Minn. 2776	-	-	-	-	-	-	-	-	103.1	103.1	101.0	101.9
Rival	105.1	100.7	100.2	103.6	102.6	101.0	100.3	105.4	100.8	101.9	99.7	101.8
Henry	-	-	-	-	102.4	103.0	101.4	104.7	101.2	100.7	100.2	101.6
N. No. 1831	-	-	-	-	-	-	-	103.9	99.8	101.6	101.2	101.4
N. No. 1898	-	-	-	-	-	-	-	-	100.3	101.0	100.2	100.5
Rescue	-	-	-	-	-	-	-	102.5	99.7	99.1	101.3	100.4
Pilot	100.9	100.0	100.5	102.3	101.6	100.2	100.0	100.9	99.3	99.0	99.7	100.1
Thatcher	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Redman	-	-	-	-	-	-	-	-	99.2	99.7	98.7	99.2
Cadet	-	-	98.8	100.4	101.0	98.5	99.7	99.5	98.5	97.6	98.6	99.1

Variety State or Nursery No.	Crude protein content of the wheat											
	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	Wgt'd. Avg.
Minn. 2776	-	-	-	-	-	-	-	-	106.3	105.1	103.3	104.2
Rushmore	-	-	-	-	104.8	101.9	100.7	103.0	103.7	102.2	100.7	102.3
Cadet	-	-	100.0	104.8	104.9	103.6	101.5	101.4	99.3	101.4	98.0	101.4
Thatcher	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mida	-	97.6	95.6	102.0	102.1	107.6	98.5	96.5	100.0	100.0	100.0	99.8
Rival	100.0	94.2	97.5	100.7	100.7	101.3	100.8	98.6	100.7	100.7	98.6	99.6
Redman	-	-	-	-	-	-	-	-	100.0	99.3	99.3	99.5
Rescue	-	-	-	-	-	-	-	97.0	96.1	100.7	99.3	98.2
Pilot	102.0	94.2	100.0	100.7	98.6	99.3	97.0	97.2	97.9	98.6	96.0	98.0
N. No. 1898	-	-	-	-	-	-	-	-	98.7	99.3	92.1	95.9
N. No. 1953	-	-	-	-	-	-	-	-	102.1	95.5	94.2	95.5
N. No. 1831	-	-	-	-	-	-	-	94.6	95.2	95.8	93.3	94.4
N. No. 1756	-	-	-	-	-	97.3	94.3	94.4	93.6	95.7	92.0	94.1
Henry	-	-	-	-	97.8	95.3	92.6	93.9	92.2	93.1	91.8	93.3



Table 12 - Continued

Variety State or Nursery No.	Yield of Flour											Wgtd. Avg.
	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	
Henry	-	-	-	-	102.8	102.5	102.4	104.4	102.3	101.2	102.7	102.5
Rival	105.5	102.7	99.4	103.1	101.2	103.4	101.9	104.4	102.4	102.0	102.0	102.4
N. No. 1831	-	-	-	-	-	-	-	105.2	100.7	101.9	102.3	102.3
Mida	-	100.7	102.3	102.5	102.7	101.9	102.1	103.8	101.9	102.5	101.5	102.2
Rushmore	-	-	-	-	101.7	101.7	101.0	105.6	102.7	100.1	101.4	101.8
Redman	-	-	-	-	-	-	-	-	100.1	101.2	100.7	100.7
N. No. 1756	-	-	-	-	-	99.6	99.9	102.1	100.4	99.3	100.8	100.5
N. No. 1953	-	-	-	-	-	-	-	-	100.1	98.5	100.7	100.3
Thatcher	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Minn. 2776	-	-	-	-	-	-	-	-	100.1	99.5	100.0	99.9
Cadet	-	-	99.3	99.6	100.0	100.8	99.2	99.2	98.4	98.9	99.0	99.3
Rescue	-	-	-	-	-	-	-	100.6	97.7	98.5	100.8	99.2
N. No. 1898	-	-	-	-	-	-	-	-	98.8	98.6	98.7	98.7
Pilot	98.5	99.3	98.2	99.4	99.9	99.7	98.1	99.3	97.7	98.1	98.5	98.1

Variety State or Nursery No.	Ash in Flour											Wgtd. Avg.
	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	
N. No. 1898	-	-	-	-	-	-	-	-	102.0	107.8	110.0	107.7
Cadet	-	-	123.9	113.5	105.7	107.1	100.0	102.1	104.2	106.0	103.9	105.1
Rival	96.1	104.0	107.5	105.8	98.1	109.1	101.9	106.5	106.3	106.0	107.7	104.8
Minn. 2776	-	-	-	-	-	-	-	-	98.0	98.0	103.9	101.5
Thatcher	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N. No. 1831	-	-	-	-	-	-	-	90.2	91.5	96.0	103.9	98.8
Redman	-	-	-	-	-	-	-	-	100.0	100.0	96.2	98.5
Rushmore	-	-	-	-	101.7	93.1	90.0	91.5	98.0	100.0	102.0	97.9
Mida	-	85.5	100.0	105.9	92.3	94.7	96.1	93.6	98.0	100.0	98.1	97.5
N. No. 1953	-	-	-	-	-	-	-	-	97.7	91.5	98.1	97.1
Pilot	100.0	98.0	100.0	101.9	96.2	98.1	90.0	95.7	93.8	98.0	98.0	96.9
Rescue	-	-	-	-	-	-	-	94.0	93.6	97.9	95.9	95.2
Henry	-	-	-	-	87.7	93.1	90.6	93.8	96.0	94.1	94.3	93.5
N. No. 1756	-	-	-	-	-	100.0	86.0	87.5	88.0	90.0	96.0	90.9

Variety State or Nursery No.	Water Absorption of Flour											Wgtd. Avg.
	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	
N. No. 1898	-	-	-	-	-	-	-	-	104.6	104.6	106.1	105.3
Cadet	-	-	109.2	104.8	106.7	104.2	104.7	104.8	103.1	103.1	104.5	104.5
Rival	103.9	100.5	102.2	103.2	105.0	102.7	101.6	104.8	103.1	103.1	104.5	103.3
Minn. 2776	-	-	-	-	-	-	-	-	103.1	103.1	103.0	103.0
N. No. 1831	-	-	-	-	-	-	-	101.6	101.5	100.0	101.5	101.1
Redman	-	-	-	-	-	-	-	-	101.6	98.5	101.5	100.7
Mida	-	97.3	99.8	98.4	101.6	100.5	100.0	101.6	100.0	100.0	101.5	100.4
N. No. 1953	-	-	-	-	-	-	-	-	103.1	100.0	100.0	100.4
Rushmore	-	-	-	-	100.0	103.3	103.1	98.4	100.0	98.5	100.0	100.3
Thatcher	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Pilot	97.8	98.9	100.5	100.0	100.0	98.5	98.4	100.0	98.5	96.9	98.5	98.9
Rescue	-	-	-	-	-	-	-	98.4	98.5	98.5	97.0	98.2
Henry	-	-	-	-	100.0	99.3	98.4	100.0	98.4	93.9	97.0	97.7
N. No. 1756	-	-	-	-	-	98.4	98.4	100.0	98.4	98.5	91.7	97.0

Table 12 - Continued

Variety State or Nursery No.	Loaf Volume, Method No. 6											Wgtd. Avg.
	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	
Rescue	-	-	-	-	-	-	-	103.1	102.8	100.0	104.8	102.4
Minn. 2776	-	-	-	-	-	-	-	-	102.7	100.9	100.3	100.8
Cadet	-	-	97.9	102.2	100.5	97.1	103.0	100.1	102.2	101.8	99.9	100.7
Redman	-	-	-	-	-	-	-	-	100.6	101.4	99.8	100.5
Rushmore	-	-	-	-	104.8	98.6	94.1	101.5	104.0	95.6	101.2	100.5
Thatcher	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Pilot	97.3	95.8	98.0	99.6	100.1	100.6	98.9	101.6	98.6	98.5	100.2	99.4
N. No. 1831	-	-	-	-	-	-	-	98.9	99.8	98.7	98.2	98.7
Rival	95.4	94.2	90.3	97.1	101.7	99.6	106.8	99.0	103.2	96.5	98.6	98.7
N. No. 1898	-	-	-	-	-	-	-	-	100.0	97.1	98.4	98.2
N. No. 1953	-	-	-	-	-	-	-	-	106.4	93.8	97.4	98.2
Henry	-	-	-	-	99.2	90.8	96.7	99.5	97.4	95.7	97.8	96.6
Mida	-	87.7	88.8	91.5	98.4	98.6	98.8	96.7	97.7	94.5	97.7	96.1
N. No. 1756	-	-	-	-	-	90.4	96.0	95.5	91.1	90.4	93.8	93.2

Variety State or Nursery No.	Loaf Volume, Average											Wgtd. Avg.
	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	
Minn. 2776	-	-	-	-	-	-	-	-	102.0	100.5	101.6	101.9
Rescue	-	-	-	-	-	-	-	100.5	101.5	100.3	106.9	101.9
Cadet	-	-	97.7	100.2	98.4	94.9	104.1	102.5	101.9	100.6	100.9	101.2
Redman	-	-	-	-	-	-	-	-	100.6	100.1	101.9	101.0
Thatcher	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Pilot	102.7	97.3	99.0	100.1	103.0	103.4	97.3	100.2	99.4	98.0	100.5	99.9
Rushmore	-	-	-	-	104.4	96.7	96.5	99.6	101.4	97.1	99.4	99.5
N. No. 1831	-	-	-	-	-	-	-	101.7	99.3	97.5	99.3	99.1
Rival	99.0	94.0	91.0	95.9	101.0	100.0	104.1	99.4	102.4	96.1	100.0	98.6
N. No. 1898	-	-	-	-	-	-	-	-	99.5	97.6	97.0	97.7
Henry	-	-	-	-	96.5	89.5	97.6	99.2	97.9	94.5	100.8	96.8
N. No. 1953	-	-	-	-	-	-	-	-	104.8	98.1	95.0	96.8
Mida	-	91.5	89.2	91.9	98.6	98.8	96.4	95.6	96.9	93.9	98.0	95.6
N. No. 1756	-	-	-	-	-	92.5	94.2	94.6	91.1	89.5	93.8	92.6

Variety State or Nursery No.	Loaf Volume, Optimum											Wgtd. Avg.
	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	
Rescue	-	-	-	-	-	-	-	101.0	103.1	99.6	106.6	102.3
Redman	-	-	-	-	-	-	-	-	101.9	99.9	102.0	101.3
Minn. 2776	-	-	-	-	-	-	-	-	102.4	101.4	100.7	101.1
Cadet	-	-	97.9	101.5	100.0	97.2	104.1	101.5	102.3	101.0	99.6	100.6
Rushmore	-	-	-	-	104.7	98.9	97.2	101.6	102.5	98.5	99.5	100.4
Pilot	99.3	96.0	98.5	100.0	101.4	100.6	97.8	100.3	101.0	98.5	99.7	100.1
Thatcher	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Rival	97.3	93.9	92.1	96.6	101.2	99.8	104.2	98.6	102.3	98.0	99.3	98.8
N. No. 1831	-	-	-	-	-	-	-	100.7	100.2	97.8	98.0	98.5
N. No. 1898	-	-	-	-	-	-	-	-	100.7	98.2	97.2	98.2
N. No. 1953	-	-	-	-	-	-	-	-	101.3	96.8	95.6	96.6
Henry	-	-	-	-	98.9	90.8	97.8	97.7	97.7	94.4	98.7	96.5
Mida	-	88.4	89.0	91.4	98.2	98.6	96.4	96.3	97.1	94.2	97.2	95.6
N. No. 1756	-	-	-	-	-	90.4	94.9	95.2	91.8	91.2	93.4	93.0



Table 12 - Continued

Variety State or Nursery No.	Crumb Color, Average											Wgtd. Avg.
	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	
Minn. 2776	-	-	-	-	-	-	-	-	113.4	108.5	113.2	112.1
N. No. 1756	-	-	-	-	-	108.6	107.2	108.4	104.8	104.9	115.8	108.9
Mida	-	108.8	103.6	111.1	107.0	108.4	105.9	108.1	108.5	106.2	115.8	108.8
N. No. 1953	-	-	-	-	-	-	-	-	114.5	115.9	106.3	108.8
Cadet	-	-	101.1	111.1	105.8	100.0	105.9	107.4	109.8	106.2	111.8	107.3
Redman	-	-	-	-	-	-	-	-	107.4	103.7	107.7	106.4
N. No. 1898	-	-	-	-	-	-	-	-	106.0	106.2	106.4	106.3
Pilot	109.5	101.7	100.1	103.6	105.8	106.0	103.5	104.8	103.7	101.2	109.1	104.3
Rival	108.9	98.2	96.4	103.6	105.8	104.8	104.7	104.9	103.7	102.5	105.3	103.7
N. No. 1831	-	-	-	-	-	-	-	102.5	100.0	100.0	106.6	103.6
Rushmore	-	-	-	-	103.4	102.5	97.7	97.8	108.6	101.2	102.6	102.5
Thatcher	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Rescue	-	-	-	-	-	-	-	97.5	96.3	96.3	102.5	97.7
Henry	-	-	-	-	90.0	91.5	89.8	96.8	93.8	86.4	98.7	92.8

Variety State or Nursery No.	Grain Texture, Average											Wgtd. Avg.
	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	
Rushmore	-	-	-	-	102.2	104.9	102.2	101.1	104.6	98.9	115.7	106.1
Cadet	-	-	94.4	102.3	101.1	97.6	104.7	102.1	103.5	102.3	102.3	101.9
Minn. 2776	-	-	-	-	-	-	-	-	104.5	98.9	102.3	101.8
Pilot	104.6	99.9	97.0	101.2	102.3	103.6	102.3	101.1	101.2	98.9	103.4	101.4
Mida	-	103.4	97.8	101.1	101.1	104.7	101.2	101.3	103.5	98.9	103.4	101.4
N. No. 1756	-	-	-	-	-	104.8	102.3	101.8	102.3	97.7	102.3	101.3
N. No. 1953	-	-	-	-	-	-	-	-	100.0	103.3	101.1	101.3
N. No. 1831	-	-	-	-	-	-	-	101.1	98.9	101.1	101.1	100.9
Rival	99.3	99.0	94.3	101.2	101.1	103.6	102.3	101.6	102.3	98.9	102.3	100.7
Redman	-	-	-	-	-	-	-	-	98.9	102.3	100.0	100.4
Thatcher	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Rescue	-	-	-	-	-	-	-	101.2	98.9	100.0	100.0	99.9
N. No. 1898	-	-	-	-	-	-	-	-	98.9	98.9	97.7	98.4
Henry	-	-	-	-	98.8	96.4	96.4	96.6	98.8	94.3	100.0	97.4

Variety State or Nursery No.	Summary of all tests for seven properties								
No. of Samples	Test Weight	Wheat Protein	Flour Yield	Absorp- tion	Opt. Volume	Crumb Color	Grain Texture	Average 7 Properties	
Minn. 2776	37	101.9	104.2	99.9	103.0	101.1	112.1	101.8	103.4
Rushmore	29	102.1	102.3	101.8	100.3	100.4	102.5	<del>106.1</del> 102.2	<del>102.2</del> 101.7
Cadet	132	99.1	101.4	99.3	104.5	100.6	107.3	101.9	102.0
Mida	130	104.3	99.8	102.2	100.4	95.6	108.8	101.4	101.8
Rival	129	101.8	99.6	102.4	103.3	98.8	103.7	100.7	101.5
Redman	30	99.2	99.5	100.7	100.7	101.3	106.4	100.4	101.2
N. No. 1953	7	104.9	95.5	100.3	100.4	96.6	108.8	101.3	101.1
N. No. 1898	11	100.5	95.9	98.7	105.3	98.2	106.3	98.4	100.5
N. No. 1831	40	101.4	94.4	102.3	101.1	98.5	103.6	100.9	100.3
Pilot	168	100.1	98.0	98.1	98.9	100.1	104.3	101.4	100.1
Thatcher	208	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N. No. 1756	68	104.1	94.1	100.5	97.0	93.0	108.9	101.3	99.8
Rescue	22	100.4	98.2	99.2	98.2	102.3	97.7	99.9	99.4
Henry	47	101.6	93.3	102.5	97.7	96.5	92.8	97.4	97.4

SUMMARY: COMPARABLE SAMPLES 1948

In table 11, the properties of the 1948 samples of 13 varieties or strains of hard red spring wheat are compared with those of Thatcher grown in the same tests. The varieties are arranged in order of the optimum loaf volume expressed as a percentage of Thatcher.

SUMMARY: COMPARABLE SAMPLES 1938 TO 1948

Table 12 gives the averages (2 to 11 years) of the milling, baking, and chemical properties of 14 varieties and strains, expressed as a percentage of comparable samples of Thatcher. These include the leading commercial varieties grown in the region and the most promising new hybrid strains that have been tested. The total number of samples tested of each variety or strain varied from 5 to 208. The more important quality comparisons for only the new hybrid strains, N. Nos. 1953 and 1898, (in the summary table 12) will be discussed in relation to Thatcher as 100 percent. The other varieties and strains in table 12 have been discussed previously in the 1947 report.

N. NO. 1953

N. No. 1953 is Pilot x Mida (C.I. 12445). It has been in the Uniform Regional Nursery for 2 years. It has been a high yielding wheat and has had the heaviest test weight of all wheats in the experiments. It is bearded and is a good dry land wheat, best adapted for the western region.

During a 3-year period <sup>seven</sup> ~~five~~ comparable milling and baking tests show it to exceed Thatcher with respect to test weight, yield of flour, grain texture and crumb color. N. No. 1953 is similar to Thatcher in hardness, according to the pearling index values. It has good milling characteristics but yields slightly less flour than expected considering its high test weight. It averages lower in protein content and loaf volume than Thatcher. The protein content, averaging approximately 0.9 percent lower in the wheat and flour than Thatcher, is due largely to higher acre yields. It averages about the same in ash content of flour as Thatcher and Mida. It has the same dough mixing time and water absorption, but requires slightly lower amounts of oxidizing agents than Thatcher for optimum bread. It has been outstanding as to test weight and crumb color of bread for the 3 years tested. It ranks seventh for the average of seven principal properties among the 14 wheats (table 12) compared.



N. NO. 1898

N. No. 1898 is Pilot x Merit (C.I. 12442). It has been in the Uniform Regional Nursery for 3 years, 1946 to 1948, and ranked second for yield of the wheats grown during that period. It is a bearded wheat, resistant to scab, and best adapted to the eastern more humid sections.

The weighted average of 11 comparable samples for 3 years show N. No. 1898 to exceed Thatcher with respect to test weight, water absorption and crumb color of bread. It has been one of the better strains in crumb color among the varieties compared. It has averaged lower in protein content, yield of flour, loaf volume of optimum bake and grain texture than Thatcher. Protein tests of N. No. 1898 have shown it to average 0.6 to 1.5 percent lower in the wheat in comparison with comparably grown samples of Thatcher and Mida. The quality of the gluten of N. No. 1898 is good. The loaf volume, although lower than Thatcher and Mida, is better than expected on the basis of its protein content. N. No. 1898 averaged highest in water absorption and ash content of flour of the 14 varieties and strains compared. It mills satisfactorily. The grain of N. No. 1898 is found to be slightly harder than that of Thatcher according to the pearling index value. It has a longer dough mixing time and requires about 25 percent greater amounts of oxidizing agents than Thatcher for optimum bread. N. No. 1898 averages eighth in the summary of seven principal properties among the 14 wheats (table 12) compared.

